Astronomical League Multiple Star Observing Program System Annotations

Andromeda

Struve 28, SAO 73956, WDS 00239+2930:
Slew 3° 24' almost due east from Alpha And, (Alpheratz) to locate this object**.** The trio forms an almost perfect isosceles triangle with the primary at the NW vertex with the C component at the eastern apex. In about a 1-degree field of view with about seven field stars you may find a few dim field stars. The AB pair are physical but not orbital with recent observations showing a decreasing separation. Spectral class of the AB pair are yellow, F7V and F8V. Parallax indicates components are non-physical, Proper motion indicates physical*** **Stelle Doppie** has the Lit. here.

Struve 42, SAO 74132, WDS 00360+2959
Star hop 52' 24" NNW, (321°) from Epsilon to locate this object. This system forms an obtuse triangle almost a degree from Delta And at 219°. The primary resides at the southeastern vertex very close to the B component. The AB pair are physical and orbital at 6.3" and increasing. The Spectral class of the AB pair are yellow, G2V and G7V.*** **Stelle Doppie** has the Lit. here.

Struve 3056, SAO 53617, WDS 00047+3416
You will find this system in a fairly rich star field almost a little over one arc-minute due north of Alpheratz, Alpha And. It forms an obtuse triangle with the primary at the SE vertex. The AB pair of this system is orbital and decreasing although at 0.7" it is not possible to observe with smaller optics. The Spectral Class of the primary is K0III, yellow-orange. The AD pair are physical although not orbital. The D component has a Spectral Class of yellow-white, FV. Possibly the reason that the C component might not be physical is that the AB, D components are about 578 LY away whereas the C component is over 700 LY away. The E and F components are Mag. 14.5 and 16.5.*** **Haas** notates the AB pair as "very lemony white and silvery white."**** **Stelle Doppie** has the Lit. here.

Aquarius

Struve 2787, SAO 126730, WDS 21218+0202:
Starhop 7° 58' almost north at 342°from Beta Aqr to center this object in your EP. This system is a bright AB pair with a very dim 11th magnitude C component off to the east. The trio form an isosceles triangle with the primary anchoring the southern vertex. The Spectral Class of the primary is A2 white. There are two field stars to the ENE (the brighter being TYC 0532-0225 Mag. 9.6) of the C component that can be helpful in locating the third star.*** All three stars appear white although **Haas** notates that the B component is "Very blue****." **Stelle Doppie** has the Lit. here.

Struve 2944, SAO 146315, WDS 22478-0414:
Slew 5° 9' SE from Eta Aqr to center this system in the EP. Here we have a tight AB pair at the base of a scalene triangle. The Primary holds the southern vertex with the B component close by at 1.8", P.A. 306.7°. The C component is 62" away to the east with a of Sep. 86°. The AB pair are orbital and decreasing. You will require over 500X to make the split. The Spectral Class of the A and C components are G2 and the B component is G4, yellow-white. There is a D component, not included in this program, listed as Mag.12.9.*** **Haas** notates the AC pair as "beige white and dim arctic blue"**** **Stelle Doppie** has the Lit. here.

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Aquila

5 Aql, Struve 2379, SAO 143606, WDS 18465-0058:
Slew 6° NW or 308° from Lambda Aql or 3° almost due north, (357°), from Beta Sct to locate this group. This system is a colorful trio with a blue/white primary, a slightly orange B component and a yellow/white C component. It forms an obtuse triangle of stars and can be found on the western edge of Aquila about 6 degrees west of Beta Scuti. The primary resides at the western vertex of the trio. They are almost equally spaced in a wide triangle including several 9th and 10th Mag. field stars within a half degree FOV. The AB pair are physical although not known to be orbital. There is a 0.1" Sep. Aa, Ab pair that are identified as MCA 53. The Primary has a Spectral Class of A2V, white. *** **John Nanson** comments in his WordPress blog here.** **Haas** comments the primary and B companion are "pure sapphire" and "whitish straw yellow and pure sapphire."**** **Stelle Doppie** has the Lit. here.

Aries

AG 38, SAO 92915, WDS 02233+1525
Starhop 8° 53' SSE, (154°), from Alpha Ari to center this object in the eyepiece. This system forms an almost isosceles triangle of three stars with the primary at the northeastern vertex. There are two field stars fairly close to the C component to the south and the SSW.*** The AB pair have been determined to be physical and increasing slightly in separation. The Spectral Class of the primary star is G5, yellow white.*** **Stelle Doppie** has the Lit. here.

STF 271, SAO 75407, WDS 02305+2514
Slew 5° 36' almost due east at 70° from Alpha Ari to center this object
in your EP. The stars form a scalene triangle with the primary and its companion to the SW, the B companion to the south of it at 13", 184° and the 12th Mag. C component NNE of the pair, quite far away at 115", 30°. The star, SAO 75410, magnitude at 9.4 has been mistaken for the C component.*** The colors of the stars are all yellow the primary Spectral Class is F6IV, yellow-white. **Stelle Doppie** has the Lit. here.

Auriga

Struve 796, SAO 58484, WDS 05499+3147:
Starhop 5° 47' SSW, (201°) from Theta Aur to locate this object. This system forms a long obtuse triangle of stars consisting of a tight AB pair at the south with the C component, off to the NNW, in a populated field of stars. The Spectral Class of the primary is A3 white.*** **Haas** notates the AB blue-white.**** **Stelle Doppie** has the Lit. here.

Struve 718, SAO 40400, WDS 05323+4924:
Slew 4° 17' NE, (36°), from Alpha Aur, Capella to locate this system. Here is an oblique triangle of stars with the primary at the NW vertex and the C component almost due south of the AB pair. There are a couple of field stars that can be notated to the southwest of the trio. The AB pair have been determined to be physical and decreasing in separation slightly over the past twelve years.*** The Spectral Class of the primary is F5, yellow-white. **Haas** notates the colors of the AB pair as "a bright pair of azure-white stars.**** **Stelle Doppie** has the Lit. here.

Struve 711, SAO 25232, WDS 05315+5439:
Starhop 8° 58' nearly north at 13.8° from Capella, Alph Aur to this system. This object is a tight AB pair forming a scalene triangle of stars with a C component almost three arc seconds away to the WSW. The AB pair is physical and orbital, decreasing about .2" since 2000. The Spectral Class of the AB pair are G1 and K2, yellow and yellow-white. With very good optics you may get an orange color on the C component. Nearby to the NNE you may get SAO 25234, Mag. 8.8. You may pick up some 10th Mag. TYCO stars in the 1° FOV.*** **Stelle Doppie** has the Lit. here.

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Boötes

BU 31 in Bootes, SAO 101264 WDS 14525+1844:
Starhop 5° 42' to the NNE, 28° from Zeta Boo to center this object in the EP. You will find a quadruple system with a tight orbital and increasing AB pair at 1.9". The A,B and C components form a tight, almost straight line to the south of the primary. The D component is off to the southwest at 259°, 1.5' away. The primary has a Spectral Class of G0V, yellow. The AC pair are physical but not considered orbital.*** **Stelle Doppie** has the Lit. here.

Struve 1854, SAO 64178, WDS 14298+3147:
Locate this object 1° 28' almost due north at 343° from Rho Boo. This system forms a wide isosceles triangle of stars with a C component off to the ESE. The system does not boast orbital characteristics although the AB pair are considered physical. The B component with Δ Mag. of 4.5 at 26", 255° is a bit awash in the glare of the primary. The primary is variable and the Spectral Class of the primary is AOVs, white. There are a couple of 9th and 10th Mag. TYCHO field stars to the north of the system which may help identify the trio.*** **Stelle Doppie** has the Lit. here.

Struve 1896, SAO 45312, WDS 14584+4403:
This system can be located 3° 42' almost due north, 359°, of Beta Boo forming a scalene triangle of stars with the primary and its companion at the eastern vertex. The most likely reason the pair have such a wide separation, 4.1", is they are only about 300 LY away and their separation is elongated. The C component is off to the NW 65" at 342° We are observing the trajectory almost straight on and there's little change in the Theta***. The Spectral Class on the primary is F8, yellow-white. The B component is considered yellow and the C component has an orange color index. **Stelle Doppie** has the Lit. here.

Struve 1843, SAO 45045, WDS 14246+4750:
This system is about 4° almost due south of Theta Boo is a fairly sparse star field. The four stars in the system form a chevron shape with the primary in the center, the B component to the south, the C component to the NE and the D star to the NW. The AB and BD pairs are considered physical but not orbital. The primary has a Spectral Class of F4V, yellow-white***. **Thuemen** reports: **"**Here's a system that's about 4° south of Theta Boo and also boasts of an orbital AB pair. Σ 1843 is about three quarters of a degree to the south and east of Σ 1834 — and yes, it's easy to get the numbers of these two stars mixed up. And I've found it can be a difficult one to locate as well. The best visual aid is to look at it as the first in a short arc of three as you move slightly southeast towards it."* **John Nanson** has a report in his WordPress blog here.** **Stelle Doppie** has the Lit. here.

Camelopardalis

Struve 866, SAO 13792, WDS 06183+6212:

This system can be found on the edge of Camelopardalis in a relatively sparse field of stars about half a degree almost due north of 1 Lyn. There are a few field stars to the southwest of the system. The three stars form a scalene triangle with the primary to the NE. The AB pair are considered physical but are not orbital.*** The Spectral Class of the primary is B9, blue-white and the two companions are considered yellow-white. **Stelle Doppie** has the Lit. here.

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Struve 373, STTA 33, SAO 12721, WDS 03221+6244:
This system can be found about 2°, 150" almost north, 344°, of a variable double, CS Cam. **STTA 33** is the AC pair. This is a scalene triangle of stars, A, C and D with the B component close to the primary at a Sep. of 20", P.A. 118°,(in line with the C component at a P.A. of 111°). The Spectral Class of the primary is F8, yellow-white. The A,B and C stars form an almost straight line to the SE with a D component off to the south.*** . **Stelle Doppie** has the Lit. here.

Struve 1075, SAO 14202, WDS 07277+6300:
You can locate this system almost six degrees nearly NE of 15 Lyn. on the edge of Camelopardalis. This is a quite wide scalene triangle of stars with the A component to the south. The B component separation at less than 10" and the C component about 4' away. There are five or six field stars in a .5° FOV. The system is best observed between 100X and 170X. The Spectral Class of the primary is K0, yellow-orange. The two companions are also orange.*** **Stelle Doppie** has the Lit. here.

Struve 617, SAO 13346 and 618, SAO 13348, WDS 05036+6305:
You can locate these systems almost 38' 30" due north of Beta Cam. Here is a complex "double double" that share one star, (the C component) all in the same FOV. The stars form an irregular line from NNE to SWS with a handy field star off to the side at both ends. They can be best observed at around 150X. The Spectral Class of the primary is F8, yellow-white.*** Check **Stelle Doppie** closely for the Lit. on STF 617 here. Struve 618 comprises the DE components closer pair off to the SSW.of STF 617. The primary is white and with very good optics you may depict a yellow C component which seems brighter than the B companion. The Spectral Class of the primary is F8, yellow-white. In a .5° FOV, look for a couple ninth and tenth Mag. field stars off to the NE and a lone 9th Mag. star to the North. Components AB and DE are considered physical but not orbital.*** **Stelle Doppie** has the Lit. for STF 618 here.

Struve 1169, PKO 21, SAO 6461, WDS 08165+7930
Look for this system near the center of the northern portion of Camelopardalis in a sparse field of stars near 80° Dec. The object can be found by slewing 3° 47' from Mag. 4.6 SAO 1551 at a WSW direction of 251° They form a scalene triangle with the primary to the SSW. The trio form an almost perfect right triangle with the dimmer C component to the east. The AB pair, at 20.6" is orbital and quite discernable as the system is only about 147 LY away. The orbit is straight on and slow so the Theta and Rho have changed little over the past 20 years. The C component is considered physical as well but not known to be orbital. The Spectral Class of the primary is G0, yellow.*** **Stelle Doppie** has the Lit. here.

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Cancer

STF 1196, Zeta2 CNC (TYC 1381-1638-1), SAO 97646, WDS 08122+1739, Tegmen:

This system can be found 8° 31' almost north, 353°, of Beta Cas, (Altarf).*** **Thuemen** writes, "It would be a good idea if, before heading out to observe this one, one takes a few minutes to check the WDS data. I count 9 components and some very significant separation, particularly for a Struve system. Depending on the AFOV of your eyepiece, a medium to wide-angle eyepiece should contain most if not all components at 80x. The data shows 3 discoverers for the total system, STF, ENH and HUT. ENH is for B. von Engelhard and HUT is for J.B. Hutchings. One would need very large optics to resolve any of the other field stars that are dimmer than mag. 11.5. At medium magnification, 30 to 50x, the pair with be very noticeably elongated, so, up the magnification. Because of the very similar brightness of the pair, mags. 6.69 & 7.41, they should hold up well with higher magnification. So...how do we describe the field...at low magnification, a wide, high contrasting brightness pair and as you increase the magnification, the brighter point of light becomes 2 points of contrasting brightness, a.k.a. STF 1196 AB, C. The AB pair is listed at mag. 4.92 and the 5.9 arc-second distant "C" companion at mag. 5.85. The "D" star is the original dimmer of the low magnification wide pair at mag. 8.89 and 275.6" of separation with a PA of 107°. To help you with tracking down the additional companions, the AB, C and D stars are oriented almost east west with the brighter end tipped about 5 degrees north. Note the AB, D separation of 275.6 arc-seconds. Spectral Class of the primary is F8V or yellow-white. The ABC trio is physical along with HUT 1. OCC 9141 is uncertain. All other pairings are optical."* For this program, try to plot the A, B, C and D components.*** **Haas** describes the AB pairs as, "[A] showcase pair, 60 mm, 45X: A bright pair of lemon-yellow stars, mostly unequal, split by only a small gap."**** The AB pair and the AC pair both are orbital and increasing.*** **Stelle Doppie** has the Lit. here.

STF 1245 (TYC 0222-1709-1), SAO 116929, WDS 08358+063:

Slew 5° 25' from Beta Cas, (Altarf), ESE, 117° to locate this system.*** **Thuemen** notes: "The data tells us that we are looking for a seven visible star system but a check of the stellar magnitudes indicates that 3 of the components should resolve fairly quickly. The AB pair, Mags 5.98 & 7.16 with a separation of 10.1" and a PA of 25° should pop into view immediately closely followed by the mag 9.60 "E" component, 114.8" and PA 207°south-southwest of the primary. All three components line up and that should confirm your location. The C & D can be found similarly spaced (110.3" & 114.8") on either side of the AB pair, east and west respectively. "F" at mag 14.60 and "G" at 12.30 are not visible in the image. Spectral Class of the A & B are F8V + G5V or yellow-white and yellow. Low RPM indicates the AB pair is physical, (not proven to be orbital). ANT 4b AG and ANT 4 EG are uncertain. The remaining pairings are not physical".* Try to plot the A, B, C, D and E components. for the MSOP program.*** **Haas** notates, "This is a bright yellow star whose companion has been called yellowish olive, (125mm, 50X); yellow-red, (Webb); purple, (Franks); and rose-tint, (Smyth)."**** See the complete data in **Stelle Doppie** here.

ENG 37, 39 CNC (TYC 1398-0027-1), SAO 80333, WDS 08401+2000

This object can be found to the north of the center of the Beehive Cluster, M44.*** **Thuemen:** A star field in the middle of M44 that will have you guessing; which 2 stars form this double[?] 39 CNC is actually a six visible star system with the A & B components having near equal magnitudes of 6.47 & 6.58. The A star has a noticeable orange tint to it and is the more northerly of the 2. Their separation is listed as 151.8" with a PA of 150°. The C component is situated 134.0" in a north-easterly direction at a PA of 309°. The C component is mag 9.03. The "D" component at mag. 8.79 lies 134.0" east-southeast or PA of 111° from the primary. These 4 brighter stars form a nice capital "L". The primary is variable and the Spectral Class is K0III or yellow-orange.* The A,B,C and D components are known to be physical.*** **Stelle Doppie** has the Lit. here.

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S 571, SAO 98013, WDS 08399+1933

Close to ENG 37 and possibly in the same FOV, about 30' away almost due south 28', you will find this system; both located in the Beehive Cluster, M44. All five stars are possible with good optics on a clear evening, except for the B companion which is Mag. 12 at 0.9" Separation. The AB, C, D and E are physical although not determined to be orbital. The primary is variable and the Spectral Class is Am, white.*** **Haas** describes the system as, "A course triple…pale yellow; dusky; lucid white… forms a very fair scalene triangle."**** **Stelle Doppie** has the Lit. here.

Struve 1300, SAO 98295, WDS 09013+1516

Located about 3° 28' almost north, (11.2°) of Alpha CNC you will find this system in a sparse field of stars. The primary has a Spectral Class of M0P:p, (red) and the B and C components are yellow. The AB pair anchoring the SW vertex of the triangle of stars are a tight orbital pair and decreasing at 5" Separation. This system is close, only 52 LY. The C and D components form an almost equilateral triangle off to the NE of the AB pair. Don't be fooled by the Mag. 8.3 star off to the SSE which isn't part of the system.*** **Stelle Doppie** has the Lit. here.

Canes Venatici

STT 269, ARN 8, SAO 63599, WDS 13329+3454:

You will find this system slightly over 8° 07" almost ESE at 111°, from Cor Caroli, Alpha CV. The stars form a striking isosceles triangle of stars with the tight AB pair forming the north-eastern leg. For an added challenge, the AB pair are a scant 0.3" and are orbital. Interestingly, the AB, C components are physical but the AB, D, **ARN 8,** components are not. The system is close at 78.9 LY. There is a Mag. 9.8 star to the NE which isn't part of the system.*** The primary has a Spectral Class of A6III, white. **Stelle Doppie** has the Lit. here.

Struve 1769, SAO 63656, WDS 13381+3910:

This system can be found by slewing 8°13' to the East and slightly North, 80°, of Cor Caroli. This is a six-star system with a tight AB pair. The AB pair are considered orbital and decreasing. The A primary has a Spectral Class of G5 or yellow and is a physical pair with the C component. This is a tough triple and the Lit. shows the "B" component at 47° at 1.5" and the "C" at 258° at 56". I split the AB pair at 261X. The "CE" pair are tough because the "E" component is Mag 16! The "D" is 13th Mag. and the "F" is almost 14th Mag.*** **Stelle Doppie** has the Lit. here.

HJ 2617, BKO 114, SAO 44277, WDS 12406+4017:

Slew ESE, 128° at distance of 1° 41' from Beta CVN Chara, to locate this system. This multiple system in Canes Venatici can quite easily be observed at around 130X in most amateur scopes. The three stars form a very wide obtuse triangle with the primary at the western vertex. **BKO 114** refers to the AD pair, the D component being Mag. 13.7,off to the NW at 43" at 343°/ It may be possible to get it with very sensitive electronic imaging. The AB and AC pairs are considered physical but have not been confirmed to be orbital. *** The primary has a Spectral Class of GO, yellow. The Lit. can be found in **Stelle Doppie**

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Canis Major

Tau CMa, HJ 3948, SAO 173446, WDS 07187-2457:
This system is in the open cluster, NGC 2362. At the center of the cluster is our subject system which is quite complex. Three of the stars for this program form a wide obtuse triangle of bright stars with the primary at the western vertex. The Spectral Class of the primary is +B2V, white. SkySafari lists the primary as a blue-white supergiant. I saw the companion as white. I was able to get the AB, AC and AD pairs at 81X. If you have spectroscopic capabilities, you see a lower magnitude in the primary as with AE and Aa, Ab. It will be a bit difficult to get because there are so many stars in the cluster. *** **John Nanson** in his WordPress blog, "Star Splitters", covers this system here.** **Stelle Doppie** lists it here as six stars all together

S 516 (TYC 6510-2296-1), SAO 171562, WDS 06193–:
Slew 7° 03' almost due south from Beta CMa at 186° to locate this object. The three stars form an obtuse triangle of bright stars with the primary at the southeastern vertex.*** **Thuemen: "**Best described as a punchy 3-star system in the shape of a hockey stick. The AB pair make up the blade of the stick while "C" provides the handle. The image suggests components with very similar magnitudes. Stellar mags in alphabetic order are, 7.32, 8.29 and 7.00. Separations and PA's are, AB @ 59.6" and PA of 8°, with AC @ 300.4" and PA of 243°. Spectral class of the primary is A1V or white. Surprisingly, given that within this submission we have come across several systems with less than 1.0 arc-seconds of separation and whose physicality was uncertain, here we have 2 pairings, AB and AC, with significantly greater separations that are physical. Parallax measurements have revealed the physicality of both pairs. The data also shows that the primary is made up of a pair of contrasting brightness suns (mags. 7.39 & 10.45) in a very tight embrace of just 0.5 arc-seconds. Position angle is 321°. Similarly surprising is that the physicality of this close pair is uncertain."* **Stelle Doppie** has the Lit. here.

Cassiopeia

Iota Cas, Struve 262, SAO 12298, WDS 02291+6724:
This system is a quite famous multiple star that can be found about 40° east of Eps Cas. It consists of a tight trio of stars with a D component off to the NE at a Sep. of 210" ***. It is covered very well by **John Nanson** in his Stars Splitters blog here.** The interesting characteristics are the colors. I noted the A as yellow/white, B as silver/blue and C as reddish/brown.*** **Sissy Haas** describes is as, "a bright lemon-yellow star touching a little blue star, with a wide third companion that's only a tiny speck."**** As **John** Nanson says, "And hanging out there in distance, all alone, is frequently ignored 8.5 magnitude "D.""** That star is designated as Mag. 8.46 HD 15149. Don't be fooled by the field star almost due east near the D companion, Mag. 11.7 TYC 4058-0371. The AB pair is considered orbital, and increasing.*** The primary is variable and the Spectral Class is A4V, white. **Stella Doppie** provides the Lit. here.

STT 496, SAO 35478, WDS 23300+5833, AR Cas:
The identifiers include **SHJ 335 AC, H 1887 FG, HJ 1888 AF, BU 1149 AI, DA 2 CD, and HJ 1186 CH.** Slew 5° almost due west 5° 05' from Beta Cas, at 267°, to locate this system. Here is a complex nine-star system in Cassiopeia. For this program we are asking for stars A, B, D, E and F. The only tough star to see, (that I couldn't get 261X), is the "H" component at Mag. 13, just north of the CD pair at Sep.26.9", 337°. *** **Luca Vanzella** reports: Turns out AR Cas is one of only a few known septenary star systems, but not a hierarchical system, rather a trapezium. My quest to determine exactly what I observed turned out to be a deep dive into the matters of observing, naming, and classifying stars that appear close together in the sky. [His] full observing report for AR Cas appears in the February 2021 issue of Stardust found here. **John Nanson** also covers this system in his WordPress blog here.** The primary is variable and the Spectral Class is B3IV blue-white. **Stelle Doppie** has the Lit. here.

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BU 1, HD 5005, WDS 00528+5638:
Here we see a six-star system which has quite a few additional stars in the mix. It can be found almost due east, 86°, about 1° 41' from Alpha Cas, (Shedar), in the Pacman Nebula, NGC 281. The three stars, AB, C and D form an open obtuse scalene triangle with the bright primary at the SW apex, the C almost due east and the D component NW of the pair at 8.9," 195°. There are at least seventeen stars in the system, most of which are greater than 12th Magnitude. We are mainly interested in AB, C and D components and there is not enough room on the PDF on the ALMSOP web page to list all the contenders. With superior optics and good conditions, you may be able to spot the E and F components at Mags 12 and 11.3. The primary has a Spectral Class of O6.5V or Blue. The D component is a ruddy brown, (although in the observation I made in 2011 it seemed yellow to me.*** The Lit. can be found in **Stelle Doppie** here.

STT 7 (TYC 4027-0572-1), SAO 11136, WDS 00218+6628:
Slew almost due north from Beta Cas, 7° 27' at about 10° to locate this object. The stars form a wide scalene triangle with the AB pair at the northern vertex. The C component holds down the south-western end and the D component the south-eastern end. This system is in the Pelican Nebula, NGC 281.*** **Thuemen:** Even to the trained eye, STT 7 resembles a trio of stars, which appear equally bright and easily resolved into a mini "Aries" asterism, with a quality 50mm finder scope. What we have is a quadruple star system, the AB pair having magnitudes of 9.21 & 9.81 separated by just .9 arc seconds and a PA of 129°. The AB pair is the central or middle star of the group. The C & D companions are listed as mags. 8.58 and 7.80. Other separations are as follows: AC @ 48.5"and PA of 259°, AD @ 109.7" with PA of 102°and the CD pair @ 155.5 and a PA of 95°. In an empty star field, they create a very striking group. Spectral class of the primary is F0 or yellow-white. The physicality of AB and CD are uncertain. Other pairings are not physical. * **Stelle Doppie** has the Lit. here.

HJ 1054, SAO 11417, WDS 00497+6046:
Slew almost due west, 273°, from Gamma Cas, 51' 45" to this system. Here you will find a beautiful quadruple star system that can easily be observed with a small telescope. The four stars string in a widely separated irregular line from east to west forming an unequal trapezium. The A primary holds down the north-western corner with the B companion almost due south of it at 8.9", 182°. The C component is the most easterly with its D companion NW of it at 26.7", 239° The AB components are considered to be physical but not orbital, increasing slightly in Separation.*** The Spectral Class of the primary is F5, yellow-white. **Stelle Doppie** has the Lit. here.

STT 9, WAL 6, SAO 21395, WDS 00262+5647:
This system, also known as WAL 6 for the AD, AE and CD components, can be found by slewing about 1° 59' almost due west, 278°, from Shedar, Alpha Cas. It is five-star system with an elusive 12.8 Mag. E component off to the ENE at 88°. This tight trapezoid shaped foursome has the primary at the southern corner hiding the B companion and flanked by the C component close by at 22", almost due north at 4°, with the D and E components spread north-south to the east of the primary. To split the components, you will require nearly 400X at the EP***. The Spectral Class of the primary is G3III, yellow. **Stelle Doppie** has the Lit. here.

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Cepheus

Struve 2816, BU 1143, SAO 33626, WDS 21390+:

This system can be found by searching for SAO 33626. One can slew a little 1°, 24', SSW at 204.9°, to find this system. It is in the middle of the Elephant Trunk Nebula, To the east of AB at C 1396 with quite a few field stars. The three stars visible in the EP about 90X, A C and D, form a wide scalene triangle with the AB pair at the south-western vertex. The C component lies to the east/southeast at 120°. The D component is to the NNE at 339° Struve 2816 refers to the AC and AD components which are considered to be physical but not orbital. BU 1143 refers to the tight AB pair, separated by a mere 1.8". The B component is Mag. 13, so it may be a little difficult to glean from the glare of the primary at 1.8" separation. There is a Mag. 13.1 E component NW of the primary which may prove to be a bit difficult to get. The colors of these stars are striking. I find the Primary to be bright yellow and the C and D components to be sapphire blue in my C925. The primary is variable and the Spectral Class is B5V(f), yellow-white, the C component B1.5V yellow-white and the D component B1V, white. Let us know what colors you see.*** **Haas** describes them as, "a bright white star between a green companion and a violet one."**** **John Nanson** in his WordPress blog covers Struve 2816 here.** **Stelle Doppie** has the complete Lit. here.

Cetus

H III 80, AB Cet, HD 18058, WDS 02260+1520:

Slew almost 1° 28' nearly due west, 266° from Sigma Cet to find this system in a sparse star field. In a half degree FOV you may pick up three field stars; one to the east, one to the NE and one to the SE. This triple forms a nice isosceles triangle with the primary at the SE vertex. The B companion lies close and to the WNW of the primary at 12", 297°.The C component lies 110" to the NNE of the AB pair at 30 The primary has been determined to be a Spectral Class of A6VpSrCr, white. °.*** **Stelle Doppie** has the Lit. here.

HJ 658, SAO 110824, WDS 02544 +0946:

Starhop 2° 21' almost due east, 98.1°, from Mag 4.6 Mu Cet to locate this fine triple. The object forms a scalene triangle of stars, easily visible at low power. At around 160X, you will be able to just split the BC pair at 1.4". The primary holds down the southern vertex of the triangle of stars. The D companion lies off to the northwest of the primary at 308°, 126.6" The AB pair and the BC pair are known to be physical but not orbital. The Spectral Class of the primary is G5, yellow. ***. **Stelle Doppie** has the Lit. here.

Columba

HJ 3858, SAO 196805, WDS 06255-3504:

Slew 1° 46' ESE, 157° from Delta Col to get to this system. Here is another system with a tight BC pair but the configuration is a very long scalene triangle with the primary at the apex to the SW of the two stars. Good optics and a clear night should allow one to split the BC pair at around 250X which is a mere 3.9" at 310°. You may pick up a Mag. 9.7 TYC star to the NW of the primary at 6', 309°. Otherwise, the field is devoid of bright field stars. The primary has a Spectral Class of K3III, yellow orange. The B star is considered A4V, white. Again, as with HJ 658, the A, BC components are considered physical, but not orbital. The BC pair with the tight separation of 3.9" is not known to be physical.*** **Haas** notes, "A bright deep yellow star with a very wide companion, which in turn is a neat close pair."**** **Stelle Doppie** has the Lit. here.

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*Double Star Imaging Project **Star Splitters WordPress Blog ***S. McGaughey Cloudy nights and other posts ****Double Stars for Small Telescopes by Sissy Haas

HJ 3875, BU 755, SAO 196978, WDS 063-3647:
The AB pair is identified as BU 755 and the AC pair is identified as HJ 3875. If you cannot find it by these identifiers, try SAO 196978. Slew 2° 38' from HJ 3858 nearly SE at 131° . Another way is to slew 4° 18' SE, at 141°, from Delta Col to find this object. The AB pair are a tight 1.6" at WSW, at 259° forming a long scalene triangle of stars with the C component is off to the NW, 21" at 302°.You may be able to split the AB pair at around 260x The AC pair are considered physical. The primary is variable and the Spectral Class is A0V, white.*** **Haas** describes the system as, "a pale yellow star and a cream colored [star], and a very close split at 100X. John Herschel's faint companion, (C), is also visible."**** .**Stelle Doppie** has the Lit. here.

Coma Berenices

Struve 1685, 12 Com, HIP 59468, SAO 100307, WDS 12519+1910, SHJ 153, (AC & BC):
Starhop 4° 35', WNW at 291° from Alpha Com to this system in a fairly sparse field of stars. This object forms a wide obtuse triangle of stars with the close, 15.8", primary and B companion at the southeastern vertex with the C component off to the NW at 241" at 328° The AB pair are considered physical but not orbital. There's a field star almost due west at 255°, SAO 100300, Mag 7.2 at 10'. The Spectral Class of the primary is Am, white, its companion, F8III, is yellow-white.*** **John Nanson** describes his observation of this system here.** **Stelle Doppie** has the Lit. here.

Corona Borealis

Ups CrB, SHJ 223, SAO 84281, WDS 16167+2909:
Slew about 2 05' almost due SSW at 214° from XI CrB to find this object. The A, C and D components are quite visible at around 200X, forming a trapezoid shape of stars with the primary at the southern vertex. There are five stars in this system with the B and E components quite elusive at Mags.13.9 and 12.1. The primary is variable with a Spectral Class of AV3, white. The D component is ruddy brown in color, probably a brown dwarf. There's a thread on Cloudy nights about the components of this system here. *** **Stelle Doppie** has the Lit. here.

Struve 1964, Zeta CrB, SAO 64821, WDS 15382+3615, HIP: 76563:
Slew 5°, 54""at 56° from Delta Boo to locate this object. You can also slew 27' 13" SSW at 211° from Zeta2 CrB, (STF 1965, not to be confused with STF 1964 although it is a fine double star in its own right). This can be considered a double-double with the western of the two systems, AB, identified as **HU 1167** at 1.2"**.** The AC and AD pairs are identified as **Struve 1964.** You will probably require at least 115X to get a split on both pairs. There is a tight, 0.2" CE pair identified as **WAK 1.** The AB pair, listed in Stelle Doppie as HU 1167, are orbital at 1.4" and decreasing. The Spectral Class of the primary is F5, yellow-white.*** **John Nanson** in his WordPress blog covers this system here.** **Stelle Doppie** has the Lit. here.

Struve 2011, SAO 84205, WDS 16076+2900:
This system can be found at 1°, 35' ESE at 122° from Iota CrB. The AB pair are tight at 2.7" forming a long scalene triangle with the C component almost due north at 350° at 117". The B companion may be lost in the glare of the primary as the Δ Mag. is 2.3 and you may need over 130X to make the split. The primary has a Spectral Class of A8IV, white and the C component is a dim Mag. 12.3 GAIA star***. **Stelle Doppie** has the Lit. here.

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*Double Star Imaging Project **Star Splitters WordPress Blog ***S. McGaughey Cloudy nights and other posts ****Double Stars for Small Telescopes by Sissy Haas

JC 16 (HIP 56078A+B), SAO 179935, HD 99922, WDS 11296-2428:
You can locate this system by slewing 4° 25' slightly south of east at 112° from Beta Crt. The trio forms a long scalene triangle with the AB pair holding the western apex and the C component quite a way out to the SE at 166", 112°***. **Thuemen** writes: Winston Salem Jacob (JC)...another virtual unknown as you research the Internet for any glimpse into his background. In spite of this, his 16th catalogued double is no slouch. In fact, it is a triple star system. Strangely, the distant "C" component was added in 1851, 4 years after the initial discovery. When the star fields are this empty, it is hard to imagine the stars evident in the field are not connected. Stellar magnitudes in order are 5.82, 8.60 and 8.86. AB separation is 8.2 arc seconds and PA of 82° with the AC being 1667.1" and PA of 112°. Since discovery of the "C" companion, there has been a 30 percent increase in the separation, 1851 (120.0") to 2015 (169.6"). One additional mag. 9.65 star (~600" distant) in the field creates a slender irregular triangle pointed southwest. The primary is variable and the Spectral Class is F3/5V, yellow-white. Oddly, the physicality of the close pair, AB, is uncertain while the wide AC pair is physical. * Do not be discouraged that you may find the AB pair difficult to glean. The Δ Mag. is 2.78. You'll need over 150X to make the split.*** **Stelle Doppie** has the Lit. here.***

Corvus

Struve 1604 (TYC 5522-1685-1), SAO 157111, WDS 12095-1151:
Slew 5° 53' almost due north, (344°), from Gamma Crv, (Gienah), at the northern edge of Corvus to find this object. The object forms a near equilateral tringle with the bright primary holding the SW apex. The B companion is almost directly east of the primary at 89°, 83" and the C component almost due north at 4°, 74". The stars display striking colors; A, white, B, red and C, blue in the EP when observed at 260X or higher. Appropriately, we decided to adopt Steve Smith's image of this colorful trio for our MSOP Logo and Pin.*** **Thuemen** writes: **[**This is a] beautiful compact trio, which is a quadruple star, because the primary is itself a spectroscopic double with a slight variability. Since the C component is brighter than the B star, confusion has occasionally set it as observations submitted suggest. It is one of the most observed systems in the WDS at 82. Depending on where you get your spectral information, the AB pair is G2 and K8 based on the Mt. Wilson Observatory and are G3V as noted in the WDS. In both cases the stars are similar to our own sun. Component mags. in alphabetic order are 6.86, 10.0 and 8.12. Separations and PA are AB -9.0" @ 88°, AC -10.3" @ 3° and BC -12." @ 321°. The only pair being physically bound is AB. Unusual for these submissions is my own observing report. [In a recent observation], I was using my SW 100 ProED scope (my imaging OTA) with 24, 8 and 5mm Hyperion eyepieces. I have to say, the more I use these Hyperions, the more I appreciate their crisp high contrast view. At 37.5x (24mm) Struve 1604 was a tight knot with just a hint of separation requiring no averted vision. Next up, the 8mm providing 112.5x. The view was very crisp and clear with all stars cleanly defined, the "B" component clearly dimmer than its companions. Now to step up the magnification a notch to 180x (5mm ep). This was revealing. I have to say most of by double star work has been imaging so I was not prepared for this. The higher magnification made it almost impossible to view the mag. 10.0, B component straight on. The image flickered in and out, but with averted vision the star held steady. Interesting! In summary, the views at 100 to 120x were far superior. The empty star field makes Struve 1604 all the more spectacular. * The primary is variable and the Spectral Class is G3V, yellow. The AB pair are physical and **Stelle Doppie** has the Lit. here.

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Struve 1659, Stargate, Neighbor to M 104, (TYC 5530-2065-1), SAO 14187, WDS 07264-6929:
This is truly one of the most famous multiple star systems in the sky. You can locate this object in a sparse star field by slewing 4° 42' almost NNE, (17.2°) from Delta Crv. If you can locate VV Crv, (another DSOP object), slew only 1° 42' almost due NW at 305° Upon viewing this six-star object, it will be clear that there are two distinct triangles of stars; a small one inside a larger one. It is most stunning in the EP at low power, e.g. 60X.*** **Thuemen** writes: [This is] truly, a magical sight to behold, 2 triangles of 3 stars with the smaller at the centroid of the larger. Again, there is no competition in this otherwise empty star field, making it one of the spring's skies finest asterisms. But there is a listed seventh companion at mag 15.50... (G component, right next to the E component, on the western edge), don't despair...it did reveal itself in the image so my best guess is that it could be in the mag 12.5 to 13.5 range, a possibility for a 6" scope of excellent quality and a more southerly observing location than 40 degrees north. Better to add near perfect seeing conditions on a moonless night. There is a possibility so give it a try. Just being in this location is reward enough so this challenge is well worth the effort since none was required for the first six companions. Spectral Class of the primary (central group) is listed as G0 or yellow. The AB pair is the only physical pair, while AC, BC and EG are uncertain.* **Stelle Doppie** has the Lit. here.

Struve 1669, (TYC 5534-1488-1), SAO 157448, WDS 12413-1301:
Slew 4° 27' in a NE direction 38.6°, from Delta Crv, (Algorab), to locate this object. Or, reverse the slew from another DSOP object; STF 1659, only 1° 42', 125.6° and you'll have it. All three stars are physical but not orbital. *** **Thuemen** writes: [This is a] triple star system with a pair of mag 5.9 suns that appear like a compact pair of bright headlights. The mag. 10.3 "C" companion will require a bit more work to resolve with good 3" optics. The AB separation is just 5.3 arc-seconds and will appear peanut shaped at low magnification. PA for AB is 314°. The "C" component is similarly spaced from the A & B stars at AC 45.9 and BC 58.7 arc-seconds creating a very narrow isosceles triangle pointed southwest. The position angle for AC is 228°. The field is virtually empty making this trio pop into view. The primary is variable and the Spectral Class is F5V or yellow-white; the B component is also F5V, yellow-white. All three stars are physically bound.* **Stelle Doppie** has the Lit. here.

Cygnus

Delta Cyg, Struve 2579, Delta (δ) Cygni, (H I 94) HIP: 97165, SAO 48796, WDS 19450+4508:
This system is of the Mag.2.9 star Al Fawaris, the NW line of stars forming the wing of the Swan. This is a wide obtuse triangle of stars, forming an almost straight line with the tight orbital AB pair on the SW side and the C component off to the NE 62.5" from the primary. There are dimmer stars identified as **Dal 37**, AD, AF, DE and FG described in the Lit. The AB pair are orbital and increasing (from 2000 to 2025) from 2.574" to 2.814". The primary is variable and the Spectral Class is B9.5IV, blue-white.*** **John Nanson** describes his encounter with the AB pair here.** **Haas** describes the colors of the AB pair as, "a crisp little globe on its edge in the lovely combination of lucid white and greenish silver. Smyth: Pale yellow; sea green. **** **Stelle Doppie** has the Lit. here

Delphinus

Struve 2673, SAO 106038, WDS 20227+1320:
You can find this four-star system 16' 19" NW, 308°, of Epsilon Del. The eastern **CD** pair are identified as **Struve 2674.** They are actually two pairs of doubles east and west of each other. STF 2673 is the tight AB pair to the west and STF 2374 is the eastern pair with the dim Mag. 11.4. The D component is 15" away, almost due north at 1°. Each of the pairs are physical but not orbital. The AB pair appear to be blue in hue although the primary is listed as a Spectral Class of F2, yellow-white. The C component has a Spectral Class of K0, yellow-orange.***. **Stelle Doppie** has the Lit. here.

*Double Star Imaging Project **Star Splitters WordPress Blog ***S. McGaughey Cloudy nights and other posts ****Double Stars for Small Telescopes by Sissy Haas

S 752, BU 987, SAO 106177, WDS 20302+1925:
This system can be found by slewing slightly over 4°09' NNW at 327° from Alpha Del. The object has three visual stars with a fourth dim D component at Mag. 15. A fifth E component can be identified at Mag. 13. The three visual stars form a wide obtuse triangle with the tight AB pair to the east of the C component. Don't give up on the close AB pair! The other identifiers are **S 752** for the AC pair, and **FOX 254** for the AE and CD pairs. The B companion may be lost in the glare of the primary as the Δ Mag. is 4.3. The Spectral Class of the primary is B7IV, blue-white.*** **Stelle Doppie** has the Lit. here.

Draco

Struve 1996, SAO 29725, WDS 15565+5717:
Starhop 1° 28' SSW, 209° from Theta Dra to find this system. The three almost equal magnitude stars form a long scalene triangle with the primary at the NW vertex. The C component is off to the SE. The AB components are physical but not orbital. The primary has a Spectral Class of F8+K, yellow-white. Look for a field star, SAO 29784, Mag. 8.7 to the west of the group to anchor it in a 0.5° FOV. I was able to split the AB pair at 261X with my C925 and a 9mm Explore Scientific EP.*** **Stelle Doppie** has the Lit. here.

STFA 25, SAO 16018, WDS 13135+6717:
Slew about 6° WNW, 304° from Alpha Dra to locate this system in a sparse field of stars. The three stars form an acute scalene triangle with the primary at the eastern vertex. With my Burgess 127mm refractor, the A and B components reveal a striking orange color. The Spectral Class of the primary is K2III, yellow-orange. The AB pair are considered physical but not orbital.*** **Stelle Doppie** has the Lit. here.

Struve 2302, SAO 8999, WDS 18028+7547
Slew 3° 17' almost due North at 340° from Chi Dra, (Minbar), to locate this triangle in a sparse field of stars. They form an obtuse triangle with the primary to the east of the three and the C component almost due west of the primary at 278°, (22.9" from the primary). There is a noticeable field star, SAO 8993, Mag. 9.8 to the NW of the system in a 0.7° FOV. The primary is variable and the Spectral Class is A0V, white. *** **Haas** describes the colors of the AB pair as, "a snow-white star with a pure gray companion."**** **Stelle Doppie** has the Lit. here.

Eridanus

Struve 518, 40 Eri, Omi 2 Eri, SAO 131063, WDS 04153-0739:
This Mag. 4.4 star can be located 1° 10' SE, 134° from Beid, Omicron 1 Eri. Here is a famous system of stars that are a part of a long line of stars in the constellation Eridanus. The primary Keid is known in Star Trek as the home of the Vulcans. The stars from a trapezoid shape with the primary at the SW corner. The BC pair are almost due east of the primary at 82.3". The D and E components are to the north at 551" and 639" respectively. The A, B and C components are all physical, while the BC pair are orbital and decreasing in Theta. There are five stars in the system. I was pleased to get four of the five with my Burgess refractor at 110X. The BC pair are nearly impossible to split with a backyard scope. Even though they are 7.7" apart, the mags are 9.5 and 11 with a Δ Mag of 1.6 and are washed out in the glare of each. The primary is variable and the Spectral Class is K0.5V, yellow orange.*** **John Nanson** covers this object very well in his WordPress blog here.** **Haas** notates, "This bright star has a famous double companion – a white dwarf paired with a red dwarf. Hartung calls the primary, (A), orange-yellow and the other stars (B and C) indigo-blue."**** **Stelle Doppie** has the Lit. here.

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*Double Star Imaging Project **Star Splitters WordPress Blog ***S. McGaughey Cloudy nights and other posts ****Double Stars for Small Telescopes by Sissy Haas

HJ 3644, BU 744, SAO 169368, WDS 04215-2544

This object may be found 4° 49' NNW, 326° from Upsilon1`Eri. The group forms a scalene triangle of stars with the tight AB pair at the southern vertex. The AB binary pair are measured at a Theta of .5"; most difficult in most amateur optics. Do not be fooled by a tenth magnitude field star 3° 41" to the NW at 303°. The D component is NE of the primary and at a Mag. 8.2. The C component is to the north of the primary is a Mag. 12.8. The primary is variable. It has a Spectral Class of F2V, yellow-white. This system is fairly close at 192 LY.*** **Haas** describes the AB,D components as, "A bright yellow star with an easy wide companion in a sparse field."**** The Lit. can be found in **Stelle Doppie** here.

HJ 3677, DAW 81, WDS 04404-2935

To locate this system, slew 5° 41' in a southeasterly direction at 133° from MSOP object BU 744 or 1° 26' in a northeast direction at 47.4° from Upsilon2 Eri. The AB pair are identified as HJ 3677 and the BC pair are identified as Daw 81. In a 1° FOV at 110X in the EP you will find the three stars of this object in a bent line forming a slight arc from the primary north to the B companion and slightly NE to the C component. There will be seven or eight field stars in the FOV including 9th Magnitude SAO 169665 northeast of the system and 10th Magnitude SAO 169669 ESE of the system.*** The AB pair are considered physical but not orbital and the BC pair are uncertain. The Spectral Class of the primary is F2/3V, yellow-white. **Stelle Doppie** has the Lit. here.

51 Eri, BU 88, Wal 32, SAO 1332358, WDS 04376-0228:

Starhop 20°, NNE, of Nu Eri about 56' to this three-star system. There is a string of stars to the south including Mag.8.9 SAO 131355. The system forms a compact scalene triangle with the primary at the vertex to the NW. The C component is to the south and the B component is to the east of the primary. For a challenge, there is a Ca, Cb pair at 0.2" with a 13th Mag. b companion. The primary has a Spectral Class of F0V, yellow white. I saw it as white.*** **Stelle Doppie** has the Lit. here.

62 Eri, SHJ 48, GMC 11, SAO 131614, WDS 04564-0510:

Slew 2° 51' almost due west, 268°, from Cursa, Beta Eri, to locate this object. One can also slew 55' from Omega Eri at 72°, ENE to center it in the EP. This group forms a scalene triangle with the primary at the SW corner. The primary has a very close companion which may be orbital, residing a mere 0.4" away at 65° P.A.. Good luck imaging that! Known more commonly as 62 Eridanus, the B and C components are quite "doable" with an amateur telescope. The A,B and C components are all considered physical. The primary has a Spectral Class of B6V, blue white. *** **Haas** describes the stars as, "A wide double star…white; lilac; a third star of the tenth mag. [forms] a scalene triangle. The primary star is pale yellow"**** This system can be verified in **Stelle Doppie** here.

66 Eridanus, Struve 642, A.K.A. HUB 5:(Swetlana Hubrig of Postdam, DE), SAO 131777, WDS 05068-0439:

This system is located about 30' 34",NNW, 327°, of Cursa, Beta Eri and about 31' 44" WSW of 5th Mag. 68 Eri at about 248°. The AB pair, **HUB 5,** are tight at 1.6" at 233° and are considered physical. The AC pair, **STF 642,** measures 52", 10°. The trio form a scalene triangle. but almost in a straight line with the close B companion to the SW of the primary and the C component to the NNE. The B companion is quite tight with the primary and will require some ingenuity with your EP. The C component is quite faint at Mag. 10.8, so don't give up! The primary is variable and the Spectral Class is B9V, blue-white. *** The Lit. can be found in **Stelle Doppie** here.

*Double Star Imaging Project **Star Splitters WordPress Blog ***S. McGaughey Cloudy nights and other posts ****Double Stars for Small Telescopes by Sissy Haas

Fornax

HJ 3518, SAO 167944, WDS 02389-2810:
This system can be found about 4° 46’ NNW or 331° from Beta Fornacis. You may prefer to slew 1° at 86.8°, almost due east, from the 7th Mag. double star Omega Fornax. The object forms an almost straight line of three stars NE to SW with the primary at the center of the group. At 9’, 153 ° to the SSE is SAO 167954 Mag. 8.4, which should anchor the object in your 0.5° FOV. The primary has a Spectral Class of F5V, yellow white. The AB pair are considered physical but not yet determined to be orbital.*** **Stelle Doppie** has the Lit. here.

Gemini

Struve 1007, SAO 96372, WDS 07006+1243:
From Mg 4.6 XI Gem, slew ESE 92.2°, 3°44’ to center this object in the EP. Or from STF 982 in the MSOP,.slew 107.2° ESE 1° 31” to find a quadruple system of stars. The A, B and C components form a close almost equilateral triangle with the primary at the south-eastern vertex. The D component is off to the NE quite a way, (67.7”). There is one dim 10th Mag. carbon star, (3’ to the east at 66°), of the D component, which you may get under clear conditions***. The primary has a Spectral Class of A2V, white. **Haas** describes the AD pair as, “Splendid view! There are two very wide easy pairs in the field – a pair of white twins.”**** **Stelle Doppie** has the Lit. here.

Struve 982, 38 Gem, SAO 96265, WDS 06546+1311:
Here is a system that can also be found almost due east at 8 2.7°from Xi Gem about 2° 17’ or from MSOP object STF 1007, WNW at 287° at a distance of 1° 31’. The trio displays a very wide, open scalene triangle with the AB pair at the southern vertex. The B companion is close at 7.3” to the SSE at 145°. The C component is NNW, 120” away at 328°. It boasts a tight orbital AB pair and a C component off to the NNW quite a way out, (120.8”). There is a D component at Mag. 15. The AB pair is orbital and increasing. The primary has a Spectral Class of F0Vp, yellow white. *** **Haas** describes the AB pair as, “A bright lemon-white star nearly touching a little grayish smokeball. Both stars are vivid with striking contrast. Smyth: Light yellow-purple.’”**** **Stelle Doppie** has the Lit. here.

Gemini

Struve 1007, SAO 96372, WDS 07006+1243:
From Mg 4.6 XI Gem, slew ESE 92.2°, 3°44’ to center this object in the EP. Or from STF 982 in the MSOP,.slew 107.2° ESE 1° 31” to find a quadruple system of stars. The A, B and C components form a close almost equilateral triangle with the primary at the south-eastern vertex. The D component is off to the NE quite a way, (67.7”). There is one dim 10th Mag. carbon star, (3’ to the east at 66°), of the D component, which you may get under clear conditions***. The primary has a Spectral Class of A2V, white. **Haas** describes the AD pair as, “Splendid view! There are two very wide easy pairs in the field – a pair of white twins.”**** **Stelle Doppie** has the Lit. here.

Struve 982, 38 Gem, SAO 96265, WDS 06546+1311:
Here is a system that can also be found almost due east at 8 2.7°from Xi Gem about 2° 17’ or from MSOP object STF 1007, WNW at 287° at a distance of 1° 31’. The trio displays a very wide, open scalene triangle with the AB pair at the southern vertex. The B companion is close at 7.3” to the SSE at 145°. The C component is NNW, 120” away at 328°. It boasts a tight orbital AB pair and a C component off to the NNW quite a way out, (120.8”). There is a D component at Mag. 15. The AB pair is orbital and increasing. The primary has a Spectral Class of F0Vp, yellow white. *** **Haas** describes the AB pair as, “A bright lemon-white star nearly touching a little grayish smokeball. Both stars are vivid with striking contrast. Smyth: Light yellow-purple.’”**** **Stelle Doppie** has the Lit. here.

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Struve 1110, Castor, Alpha Gem, SAO 60198, WDS 07346+3153:
This is a very famous multiple star first discovered to be111 a gravitationally bound object by Giovanni Cassini in 1678. The system consists of four stars, all observable with medium size optics. The AB pair are orbital and increasing. The C component is off to the SSE at 163° and the D component is to the southwest at 221°. The primary is variable and has a Spectral Class of A1V, white.*** **John Nanson** has a very comprehensive discussion of this system here. He notes that the A and B components have companions that can only be observed by spectroscopically** **Haas** describes the AB pair as, "A stunning pair of brilliant stars, lemon white in color, that are just kissing at 65X."**** **Stelle Doppie** has the complete Lit. here.

Struve 1102, SAO 96964, WDS 07304+1352:

This is a five-star system that can be found by slewing 4° almost SW at 131° from Lambda Gem. The stars form a long trapezoid shape. if you can glean out the B companion from the glare of the primary. The A,B and D components form an almost right triangle with the AB pair pointing NE and the D component off to the SE. The C component is a scant Mag. 13 which will probe to be difficult in the glare of the AB pair, Sep. 21.8", P.A., 77°. The AB pair are tight at 7.7" and are considered physical as are the AD pair. The primary is variable and has a Spectral Class of F5, yellow white.***.**Stelle Doppie** has the Lit. here.

Struve 1054, SAO 59962, WDS 07181+3457:
This system can be found by slewing 4° 48' NW at 312° from Castor. It consists of three bright stars in a long scalene triangle with the primary at the southeastern vertex. The group is quite close at 138 LY and the AB pair are considered physical. The primary is a quite noticeable yellow white, with a Spectral Class of F2.*** **Stelle Doppie** has the Lit. here.

Hercules

STFA 31, SAO 121776, WDS 16406+0413:
Slew 3° 18' almost due NE, 47.3°, from Lambda Oph to locate this object. The three stars in this system form an almost right triangle with the primary at the northeastern apex. There is a tight, spectroscopic, companion to the primary identified as CHR 25 Aa, Ab. The AB pair are identified as STFA 31 and are physical but not determined to be orbital. The BC pair are identified as Struve 2074. The Spectral Class of the primary is A1V, white. *** **Stelle Doppie** has the Lit. here.

Struve 2083, SAO 102337, WDS 16427+1336:
Starhop 7° 46' almost due west at 265° from Alpha Her, (Rasalgethi), to locate this object. The physical AB pair are close "Cat's Eyes" at almost the same magnitude with the 11th Mag. C component off to the WNW, 119", at 191°. The three stars form an obtuse triangle with the primary at the eastern vertex. The AB pair are considered physical but not orbital. There is a 12.7 Mag. GAIA star close and to the east of the C component that is not part of the system. The Spectral Class of the primary is G5V, yellow. *** **Stelle Doppie** has the Lit. here.

Struve 2052, SAO 102200, WDS 16289+1825:
Slew 1° 48' in an ESE direction, 113.9°, to this object from Gam Her. The AB pair are almost equal magnitudes, and are orbital, at 2.4" and increasing. The C component is off to the SE quite a way, 136", and is quite dim at Mag. 11.8. The primary and B companion both have a Spectral Class of K3V, yellow-orange*** **Haas** describes the AB pair as, "A difficult but attractively close binary star. It's a bright citrus-orange star, which was seen intermittently as a pair of kissing stars. They look nearly equal."****. **Stelle Doppie** has the Lit. here.

100 Her, Struve 2280, SAO 85753, WDS 18078+2606:

This system lies almost due south, 178.6°, from Omicron Her at 2° 39'. Three objects make an obtuse triangle with the primary at the northern vertex. The AB pair form another "Cat's Eyes" at nearly equal magnitudes 14" apart. The C Mag. 11.8 component lies nearly 80" to the SE and may require some power to glean out of the darkness. The primary is variable and the Spectral Class is A3V, white. *** **Haas** describes the AB pairs as, "…a bright pair of identical stars, fairly close together, that are possibly a chance alignment – a remarkable coincidence if they are. They're white."**** **Stelle Doppie** has the Lit. here.

Hydra

Struve 1316, HD 78391, SAO 136596, WDS 09079+0708:
Locate this object 5° 06' almost west, 286°, from Alpha Hya, (Alphard). The group forms an obtuse triangle with the primary at the eastern vertex in a sparse field of stars. The AB pair are considered physical. The B companion is to the SSE and the C to the NW. The primary has a Spectral Class of G0, yellow. **Stelle Doppie** has the Lit. here.***

DUN 116 SAO 202965, WDS 11567-3216:
Slew 1° 49' NNE at 26° from Beta Hya to locate this object. The three stars form a scalene triangle with the primary at the western vertex. There are two more components, at a greater magnitude than 13 and may be gleaned with superior optics and good conditions. There should be four or five field stars at low power in a 0.5° FOV. The AB pair are considered physical and reside at a distance of 154 LY. The Spectral Class of the primary is G3V yellow; the secondary, G4V, yellow. *** **Stelle Doppie** has the Lit. here.

Lacerta

HJ 1823, SAO 52433, WDS 22518+4119:
Starhop from 6 Lac 4° 20' almost SE, 112.8° or 2° 8' WSW, 242° from Omicron And to locate this object. This system will require some power to pry the components apart, particularly the 11th Mag. AB and CD pairs. The E component is off by itself to the WSW almost 2 arc minutes at 263°, in the same line as the B companion. If optics allow and the conditions cooperate, this is a showcase sight to see in a multiple system! With a good refractor, the blue color of the primary may reveal itself at a Spectral Class of B8V, blue-white. **Stelle Doppie** has the Lit. here.***

Leo

STT 204 (TYC 0824-1224-1), HIP 47336, SAO 98690, WDS 09388+1047:
Slew 7° 21' almost due west from Regulus, Alp Leo, at 261° to locate this object. A closer object to Starhop from is Omicron Leo. Slew 1°, 03' at 326.5° to center the object in the EP.*** **Thuemen** writes: If you really work your imagination and the 3 stars in the field, what you might see is a long-shafted hockey stick with a blazing star at the toe of the blade. This also happens to be our subject double, STT 204. Our primary is reasonably brilliant at mag 6.7, made even brighter by the few additional field stars. Data reveals a secondary of mag. 10.7. Separation is a compact 8.3 arc seconds and PA is 99°. The shaft is oriented southwest northeast. Spectral class of the primary is A5III-IV or white. The nature of the pair's physicality is uncertain.* **Stelle Doppie** has the Lit. here.

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Struve 2799, HIP 106053, SAO 107165, WDS 21289+1105:
Starhop 3° 57' almost due west at 288° from Epsilon Peg, (Enif), to locate this object. Thuemen writes: Here is a delightful sight in a 5" refractor. You can conjure up a number of 3 and 4 star geometric shapes. Our subject system dominates the field with its tight AB pair showing a slight elongation in an east west direction. AB component Mags. are 7.37 and 7.44 with a separation of only 1.89 arc-seconds. The observations indicate that this is a 4th grade orbital pair, 1 being definitive and 9 being indeterminate. The "C component has a huge separation of 136.3" and a magnitude of 10.20. There should [be] little trouble spotting this companion to the north-northwest (PA 331°) in smaller scopes. Look to the south-southeast, opposite the "C" component from the AB pair and 2.5x the AB,C distance. See if you can make out the small right-angled triangle. Once you have the triangle firmly in your grasp, see if you can extract a mag. 13.55 ember located 30" to the northeast of the triangle member star that is nearest the AB pair.* The AB pair are a tight orbital binary and are slightly increasing. The Spectral Class of the primary is F4V, yellow-white. *** **Stelle Doppie** has the Lit. here.

Struve 1364AB + HJ 466AC (TYC 1409-1698-1), SAO 80890, WDS 09320+2003:
Starhop 2° 55' almost due south at 178.6° from Lambda Leo to locate this object.*** **Thuemen** writes: [Is this a] Leo double-double? Four bright stars dominate this field, a close pair and a wide pair. I guess the more appropriate double double is Epsilon 1 & 2 in Lyra which boasts 2 compact equal brightness pairs, also known as STFA 37 & STF 2383. Don't be fooled. Your focus should be directed to the more compact pair. What we have here is a primary with two companions from 2 different catalogued pairs. Struve 1364 is comprised of the close bright pair having magnitudes of 8.5 and 10.0 with a separation of 16.4 arcseconds and a PA of 155°. The C component of HJ 466 is to the opposite side of the shared primary star from the Struve B star. Its 11.7 magnitude will have you averting vision just to get a glimpse. Separation of AC is 37.5 with a PA of 76°...Hey!! That's not correct...my image and that from the SDSS clearly show something is in error. A quick check in Aladin has confirmed a PA in the order of 297 degrees. Looking at the WDS data indicates the original observation/measurement to be 295°so the most recent entry must be a typo. A clear dark night with good seeing and quality 4" optics may just allow viewing the dim "C" companion straight on. Have a close look at the brightest star in the field. Do you notice the subtle orange hue of this mag 7.35 star? Spectral Class of the primary is F5 or yellow. Proper motion studies indicate the AB pair to be physical while the AC pair is not. The discovery of the PA error for HJ 466AC was discovered on March 11, 2019.* **Stelle Doppie** has the Lit. here.

Lepus

HJ 3780 (TYC 5921-1652-1), BU 321, SAO 150652, WDS 05393-1751:
Slew 1° 34' almost due east at 91.2° from Alpha Lep, (Arneb), to locate this object. There are six stars that will show well at around 80X.The AB pair show as one, the CD pair, to the SE at 137° show as another one. The E and F components are off to the NE. The H component is closer to the AB pair at 40", 308°.You might even pick up the G component between the AB and the E component at 59.6", 51°. *** **Thuemen** writes: [This is a] wonderful piece of celestial real estate...very reminiscent of the "Seven Sisters" a.k.a. the Pleiades open cluster. In this case, the image captures 6 sisters/companions of a 9 component system...actually captures 7 stars, given that the AB pair also known as BU 321(6.69 & 7.83) appears as a single star by virtue of the 0.5 arc-seconds of separation. Five of these components are mag. 8.89 or brighter**.** The Spectral Class of the primary is B7V or blue-white. All the brighter companions appear to have similar color. Three pairs are listed as physically uncertain, these being AB, AH and CD. All other pairings are visual.* **Haas** has this description of the grouping, "This is a broad little cluster of four bright stars - a bright white star inside a triangle of three small gray ones."**** **John Nanson** discusses this multiple in his WordPress blog here.** **Stelle Doppie** has the Lit. here.

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Lynx

5 Lyn, S 514, Wal 46, SAO 25733, WDS 06268+5825:
Here is a colorful system found 1° 6' ESE or 121° of 2 Lyn. The system forms a wide trapezoid shape with the primary at the northern corner, the C component is to the west of it. It consists of a bright AB pair at 32.6", 140° and the 12th Mag. D component, **Wal 46**, off to the SW at 92.8", 168°. The components can easily be viewed at around 100X in good conditions. I saw the primary as a golden yellow color and the B component as silvery blue. The Spectral Class of the primary is K4III, yellow-orange. *** **Haas** describes the stars as, "A brilliant grapefruit-orange star and a small pinkish white, super-wide apart; B not seen. Smyth: a coarse triple star [A] orange tint; [B] blue; [C] pale garnet."**** **Stelle Doppie** has the Lit. here.

Lyra

STT 525, SHJ 282, SAO 67566, WDS 18549+3358 in Lyrae:
Here's a four-star multiple system that is a nice challenge. Slew 1° 10' NE, 58°, from Beta Lyr to locate this object or 1° 32" at 326° from Gamma Lyr. With the Primary in the center, the B and C components flank it to the North and South. The D component is off to the NW at 214", 295°. The C companion, identified as SHJ 282, although not proven to be orbital, has been determined to be physical and increasing, having been tracked since 2004. The Spectral Class of the primary is AB, white. I'm not sure why the AB pair are considered "uncertain" in the Lit. It turns out that this multiple star in Lyrae, STT 525, SHJ 282, is a triple with a fourth star! You can get all four at 115X in good conditions. It is challenging to observe all three and still get the D component in the EP as well. The D component can be found in **Stelle Doppie** here as part of SHJ 282. The Δ mag on the AB pair is 2.98. To get the D component, and 11th magnitude star at 214" separation it gets fun. The Spectral Class of the primary is A8, white.*** **Stelle Doppie** shows it here

Monoceros

10 Mon, HIP 30772, SAO 133290, WDS 06280-0446:
Starhop 3° 35' ENE 65:from Gamma Mon to center this object in your finder scope. An alternative is to slew 2° 16' almost due north from Beta Mon at 354°. The three stars form an almost isosceles triangle with the primary at the NE apex.*** **Thuemen** writes: Your first impression will be...a nice, 10-to-12-star open cluster of white suns with a single orange sun thrown in for contrast. The WDS provides another name, that of BUP 89 AB (Burnham Proper Motion Catalogue), for this delightful grouping. Now that I look at my Cambridge Double Star Atlas, the descriptive "open cluster" is absolutely correct. We have found the open cluster NGC 2232. The mag. 5.06 blue-white (B2V) primary has 2 dance partners with the "C" component at mag. 9.2, being the aforementioned orange sun set 78 arc seconds to the southwest of 10 Mons. The mag. 9.2 "B" star is located ~32" to the north of the "C" star and 77" from the primary. * The Spectral Class of the primary is B2V, blue-white. *** **John Nanson** describes his observations of this system here.** **Stelle Doppie** has the Lit. here

Ophiuchus

Struve 2050, SAO 159961, WDS 16308-1308:
Slew 25' 15" from M 107 almost due west at 259° to locate this object. This system forms a right triangle of stars with the AB pair at the southern vertex, the B companion close by to the west at 218° and the C component out to the NW at 295.° The D component is to the WNW at 295° and is quite dim at Mag. 12.9. The AB pair are tight at 5.6". You may catch three field stars to the east in a Low Power, 130X, FOV.*** The Spectral Class on the primary is A0IV/V, white. **Stelle Doppie** has the Lit. here.

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Rho Oph, H II 19, SAO 184382, WDS 16256-2327:
This object is right in the middle of the Rho Ophiuchi Nebula, IC 4603, Collinder 302, at the southwestern edge of Ophiuchus. The AB, C and D components form an obtuse scalene triangle with the AB pair at the SE vertex. The AB pair are a tight 3", orbital and decreasing. With good optics and conditions, the two can be pried apart at greater than 175X. The CF component, KOU 63, is a tight pair to the north of the AB pair and the DE, BU 1115, is a tight pair in itself, off to the WNW at 296°. The Spectral Class of the primary is B2IV, blue-white. *** **Haas** describes the object as, "A bright pair of touching stars, amber yellow in color." Smyth: "There are two other companions [besides B]…the whole forming a pretty group."**** **Stelle Doppie** has the Lit. here.

Orion

Struve 788, SAO 113093, WDS 05447+0350:
Slew SSW, 216° about 4° 25' from Betelgeuse. The Spectral Class of the primary is B9, blue-white. Mags. A 7.6, B 10, C 10.3; Seps/PAs AB 7.5"/91°, AC 36.2"/149°. The three stars form an obtuse scalene triangle with the primary at the northwestern vertex, the short leg to the B component to the east and the C component off to the SSE. In a 100X, 0.5° FOV you should get Struve 789 to the north near the edge of the FOV which is a nice triple star as well.*** **Haas** describes object as, "…a bright straw-yellow star, (the primary of STF 789)."**** **Stelle Doppie** has the Lit. here.

BU 193, HD 43286, SAO 113645, WDS 06155+0357:
Starhop 6° 07' ESE at 124° from Betelgeuse to locate this object. Otherwise, slew WSW at 253° just over 2° from Epsilon Mon to locate this system. The stars form an obtuse isosceles This triple star has a blue primary with a white "B" and "C" companion. The primary and the B component are very close to the ESE at 19.7", 97°. The C companion is off to the WSW of the primary at 57.8", 232°. The Spectral Class of the primary is B5V, blue-white. It is best viewed in the EP at around 261X, 0.4° FOV. Do not be fooled by the 11th Mag. field star beyond the C component, 2' out from the primary at 247°; it is not part of the system. The field star to the WSW near the edge of the F.O.V. is HD 43213, mag 8.09. The two stars to the east almost to the edge of the F.O.V. may be 12th mag. GSC 0140-1495 and 13th mag. GSC 0140-1767.*** **John Nanson** eloquently discusses this trio and posts my sketch in his WordPress blog, "Star Splitters" under the title, "A Tale of Two Secondaries," found for Part one here and Part Two here.** **Stelle Doppie** has the Lit. here.

Struve 815, HD 39731, SAO 113262, WDS 05546+0521:
This system can be found about 2° almost due south, 184°, from Alpha Ori, (Betelgeuse). The three stars form an almost straight-line NE to SW with the primary in the middle. The AB pair are physical and are possibly orbital and increasing at 13.1". The C component is off to the NE at 85", P.A. 309°. The system is close at 450 LY. You may pick up 7th Mag. SAO 113268 at 166X, at about 0.4° F.O.V. to the east of the system 5' away from the system in your Low Power view. The primary has a Spectral Class of G5, yellow. **Stelle Doppie** has the Lit. here.***

SHJ 49, SAO 94240, WDS 04590+1433:
Slew your scope 1° 12' NNE, 31° from Omicron2 Ori to locate this multiple star. This system is four stars, forming an almost straight line. The Mags. are A 6.06, B 7.43, C 9.6, & D 13.2. All stars are designated white although through the EP the primary seems slightly yellow. The "B" companion seems a little bluish and the "C" companion silver in the EP at 90X. The "D" companion is almost the same position angle as the "B" companion although at a Sep AD, 88.9" instead of AB, 39.3" and it's pretty dim at 13th Mag. Don't be fooled by the 12 Mag. GAIA to the east of the C component. The Spectral Class of the primary is B7V, blue-white. *** **Haas** describes the grouping as, "a bright white star between two dim companions. The trio forms a neat boomerang shape. Castle, 150mm, 171X: the A and B members are yellowish and bluish."**** **Stelle Doppie** has the Lit. here.

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Struve 697 SAO 94512, WDS 05235+1602:
This object can be located at the very northern edge of Orion 6° 43' NNW at 335°, from Lambda Ori, (Meissa), or 6° 05; WSW at 213° from Zeta Tau. The object is a 5-star system in the Open Cluster Collinder 65. The four stars form an almost straight east-west line with the primary on the eastern end. Even though it is on the edge of the Open Cluster Collinder 65 in Taurus, it's in Orion. The Spectral Class of the primary is B7V, blue-white. I could not get the Mag. 13.89 "E" companion between the "C" and the "D" components, (understandably). Surprisingly I was able to get the field star, GSC 1296-1531, Mag 12.9 to the south of the "D" companion!!! I slewed at sidereal speed back and forth and it popped into view by averted vision. I did notice a slight pink hue to the primary and a ruddy brown tinge to the "B" companion. All the others were white in my EP at 178X, .32°FOV.*** The object was covered extensively by **John Nanson** in his blog, Star Splitters, here.** **Stelle Doppie** has the Lit. here.

Struve 761, HD 294271, SAO 132399, WDS 05386-0233 & 762, SHJ 65, SAO 132408, WDS 05387-0236:
This being one of my all-time favorites and a Blockbuster double triple when viewed in the EP at 79X. STF 761 is located 48' 48", SW, 221°, of Alnitak, Zeta Ori. This double system, making up nine visual stars, is easily observable with a 103mm refractor at 79X, 0.6° FOV. It is a delightful sight with the brightest star of the two systems being the primary of STF 762, Sigma Ori, at Mag. 3.7. The two systems are 3' 27" apart at a P.A. of 323.7° from Sigma Ori. The H, HD 37525, and I, HD 37564, components of STF 762 are quite a way out although observable at Mags 8. There are two 12th Mag. GAIA field stars between the two systems that are not part of either although if you can catch them with good optics, great! The Spectral Class of the primary STF 761 is B5V, blue-white.*** **Haas** describes Struve 762 as, "Showcase system, 60mm, 25X: A bright straw-yellow star with two dim companions, (D and E).The trio has the shape of a tight fishhook."**** The Lit. for STF 761 can be confirmed in **Stelle Doppie** here and for STF 762 here.

Pegasus

Struve 2799, SAO 107165, WDS 21289+1105:
Here is a system that can be found a little under 4° from Enif, Eps Peg almost due west at 288°. The AB pair forms a tight cat's eyes with a third star forming a long scalene triangle off to the NNW 135.9" away at 331°. The primary has a Spectral Class of F4V yellow-white while the AB pair are orbital, increasing 0.02" since 2000, (they are only 342 LY away). *** **Haas** describes the AB pair as, "A modestly dim but attractively close binary star. It's a pair of amber-yellow twins split by a hair at 200X.**** **Stelle Doppie** has the Lit. here.

Struve 3060, SAO 91707, WDS 00059+1805
Starhop 3° 22' from Gam Peg NNW, 329°, to locate this object. Here is an intriguing system that has some deceptions.** The A, B and C trio form a scalene triangle with the primary at the northern vertex. The AB pair are orbital and decreasing slightly. The system is quite close at 121 LY. The primary has a Spectral Class of F8, yellow-white. The D component, HD 101, is quite bright at Mag. 7.4 and forms almost a straight line with the AB pair nearly due north, 572". Don't be fooled by the 10th Mag. field star about half way to it.*** **John Nanson** covers the system in his WordPress blog here**. **Stelle Doppie** has the Lit. here.

*Double Star Imaging Project **Star Splitters WordPress Blog ***S. McGaughey Cloudy nights and other posts ****Double Stars for Small Telescopes by Sissy Haas

Perseus

Struve 162, SAO 37536, WDS 01493+4754:
Starhop 2° almost due east, 110°, from Ups Per, (51 And), to locate this object. The AB are very tight at 1.9", (there is an orbital Aa, Ab at 0.1"). The three stars, the C and D forming an almost perfect long right triangle with the AB pair at the northeastern apex; the C component to the south at 20" and the D component to the south-east at 138", 96°. The Spectral Class of the primary is A3V, white. The AB pair are physical, not proven to be orbital, and increasing 0.2" since 2007.*** **Haas** describes the group as "An attractive and interesting triple. It's three stars in a cone shape – a touching pair of straw yellow twins and a wide little bluish star."**** **Stelle Doppie** has the Lit. here.

Struve 270, SAO 23389, WDS 02308+5533:
Starhop from Eta Per, (Miram), 2° 48' almost due west, 265°, to locate this object. The three stars form an obtuse triangle with the primary at the SE vertex. The D component is almost due west at 333° with a separation of 51". Our focus is centered on the A, B, C and D components as the E star is over Mag. 14. The AB pair are considered physical. The Spectral Class of the primary is F4V, yellow-white.*** **Haas** describes the group as, "a wide pair with a tiny companion."**** **Stelle Doppie** has the Lit. here.

Zet Per, Struve 464, SAO 56799, WDS 03541+3153:
The third brightest star in Perseus at the lower foot of the Perseus figure, this star has five visible companions which are quite easily observed with smaller optics under good conditions at 260X. The A, B and C components form a right triangle with the primary at the NE vertex with the two almost equal Magnitude D and E components off to the south. The AB and AE pairs are considered physical. The primary is variable and has a Spectral Class of B1Ib, blue-white. *** **Haas** describes the object as, "A miniature Rigel, grand! It's brilliant banana-yellow star with a speck of blue light at the edge of its glow. Smyth: Flushed white, smalt blue. Webb: green white, ash."**** **Stelle Doppie** has the Lit. here.

Struve 533, SAO 57211, WDS 04244+3419:
Starhop 7° 55' almost SE, (135°) from Eps Per, or 6° 44' from Zeta Per at 68.5°, to locate this object. There are three bright stars in a row, 56 Per, 55 Per, and V 590 Per, north-south, with V 590 Per, STF 533 AB, at the north end of the line. The primary is determined to be physical but not orbital. The three stars in the system form a long obtuse scalene triangle with the primary at the western vertex. The B companion is off to the NE at 19", 62°. The C component ids almost due south of the primary at 106", 193° There are three field stars forming a triangle to the south and two stars to the north that anchor the object in the FOV at 261X. I observed the Variable A component to be quite yellow although the Spectral Class is known to be B8V, blue-white. *** **Haas** describes the A and B components as, "60mm, 25X: Splendid view. This wide pair lies in a straight line with two bright white stars, (55 and 56 Persei). It's a fainter white star with a little gray companion.**** **John Nanson** covers this object in his WordPress blog here.*** **Stelle Doppie** has the Lit. here.

Pyxis

HJ 4199, SAO 177288, WDS 09200-2747:
Slew from Gamma Pyx, 6° 30' almost due east at 92.3° to locate this object. Here you will find a very wide small obtuse scalene triangle of closely separated stars with the primary at the vertex to the north. The C component is the closer star at a Mag. 8.2. to the west at 6.7", 269°. The B, a greater Mag. than the C component, is ESE at 11" ESE at 111° The AB pair are considered physical but have not been determined to be orbital, probably because the system is 1200 LY away which would position the two other components at a great distance from the primary. The Spectral Class of the primary is A0V, white.*** **Stelle Doppie** has the Lit. here.

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HDO 204, SAO 199589, WDS 08451-3215:
Starhop from Alpha Pyx 1°, 08' NNE at 26° to locate this object in a fairly sparse star field. The trio form an almost equilateral triangle with nearly equal Magnitude B and C components with the primary at the southeastern vertex. To anchor the object in the EP at about 160X, you may locate a cool WDS double, SAO 199578 to the WSW at 11'. Also, another WDS double, SAO 199678 to the ESE at 1°, The Spectral Class of the primary is K1III, yellow-orange. **Stelle Doppie** has the Lit. here.

HJ 4106, SAO 199328, WDS 08314-3642:
Slew 2°14' SW, at 231°, from Beta Pyx to locate this object. There you will find a tight AB pair forming a long obtuse triangle with the primary at the vertex to the NE end with the B companion close by. The B companion is close to the primary at 6.2", at 308°.The C component is off to the SE at 47.7" at 219°. In a 0.5° FOV, 261X, you should pick up eight or nine field stars including SAO 199333, Mag. 8.9 to the north and SAO 199311, Mag. 8.1 to the WNW. The Spectral Class of the primary is K1IV, yellow-orange. *** **Haas** describes the system as, "Gould, 175mm, 100X: A pleasing, fairly delicate pair with an orange-yellow primary. It lies in a rambling line of stars with an asterism to the west."**** **Stelle Doppie** has the Lit. here.

Sagittarius

HJ 5000, V1647, HD 163708, SAO 209552, WDS 17592-3656 & DUN 219, HR 6691, HD 163651, SAO 208545, WDS 17589-3652:
This is a very southerly double triple but well worth traveling to a good latitude to observe, if they are too low in the sky for viewing from your location. To find the pairs, slew about 3° 41' almost due west at 265° from Sephdar, Eta Sagittarii**.** HJ 5000 is the southern system and DUN 219 is 6' 05" at almost 322° to the northwest of HJ 5000. You will require about 160 power to get these two systems in the same FOV and still separate the components. DUN 219 forms a nearly perfect equilateral triangle with the primary star at Mag 7 at the northeastern vertex, the B component at the western vertex and the C component at the southern vertex.*** This trio of stars are not physical. **Stelle Doppie** has the Lit. for DUN 219 here. The Spectral Class of the primary is G8III, yellow. HJ 5000 has a primary at Mag. 5.7. The three stars form a long obtuse triangle of stars. The primary is located at the western vertex, the B to the east and the C about 40" to the northeast of the AB pair forming the apex of the triangle of stars. The AB pair are physical and orbital with a period of just over 1200 years. The Spectral Class of the primary is A3III, white. **Stelle Doppie** has the Lit. for HJ5000 here. I posted on **Cloudy Nights** about these two triples here.*** **Haas** describes them as doubles, "These pairs are just arcminutes apart. Gould, 175-mm, 100X 'very easy…and visible in an 8 X 50 finder…Its main star is yellow.' H[J] 5000 is an easy, uneven, attractive white pair."****

Scorpius

HJ 4935, Gliese 677, MLO 4, SAO 208670. WSD 17190-3459:
This multiple system can be found by following an almost straight line from Kappa Sco, (Girtab), through Ups Sco, (Lesath), 6° 11' in a NW direction, 308°. It is to the north of the Cat's Paw Nebula, (NGC 6334), about 47' NNW at 336°. The three visible stars form a long scalene triangle with the AB pair anchoring the NW vertex of the triangle. The C component, HJ 3945, is to the SSE at Sep. 32.6". The D component is to the NW at 285° from the AB pair The AB pair, MLO 4, are a very close, 1.4", orbital pair and increasing. The AC pair are physical but not orbital. This object is notable in that it is one of a number of nearby multiple stars that have exoplanets having been studied for a number of years described in a **Sky and Telescope** article found here. The C component has seven exoplanet candidates, three of which lie in the habitable zone. The primary and B companion have Spectral Classes of K3V, yellow-orange and K5V. These stars are quite stunning in the EP at 261X, 0.2° FOV when conditions allow. The D component may be tough at Mag. 12.45 off to the NW, Sep. 92", P.A. 285°.*** **Stelle Doppie** has the Lit. here.

*Double Star Imaging Project **Star Splitters WordPress Blog ***S. McGaughey Cloudy nights and other posts ****Double Stars for Small Telescopes by Sissy Haas

Struve 1998, XI Sco, SAO 159655, WDS16044-1122 and 1999, SAO 159668, WDS 16044-1127:
To locate STF 1998, Starhop almost due north from Graffias 8° 26' 10" , at 358° or almost due west, 2° 22', at 281°, from Chi Scorpii. To be clear, this is a striking double triple, one of a few in this MSOP List. The B component of STF 1998 is orbital, very close to the primary at 1.1" and closing, (it was at a maximum separation of 1.128" in 2021). You will need to power up to about 780X to split the AB pair. The three stars form a long obtuse triangle, with the primary at the SW vertex. The B companion forms the shorter side to the north and the C component 8" almost due east. Both the B and the C stars are orbital. The orbital period of the B companion is about 46 years and of the C companion, about 1514 years. Almost 4° 40' almost due west, 168°, of STF 1998 you will locate STF 1999. The system will appear at two "cat's eyes" all by themselves. Powering up to about 260X you should see the C component almost due east 85" away almost in a straight line forming a long obtuse triangle of stars with the primary and its companion on the southwestern vertex. Don't be confused to see that the D component of STF 1999 is the AB pairing of STF 1998. The primary and BG companion of STF 1998 have a Spectral Class of F5IV, yellow-white. The primary of STF 1999 displays a Spectral Class of GBV and the B companion, K0V, yellow/yellow-orange.*** **John Nanson's Star Splitters** has a great segment on these two triples here. He notes that STF 1998, XI Sco, used to be referred to as Graffias, although now it belongs to Beta Sco. He also confirms that "Even more intriguing, the cramped AB pairing of Σ 1998 is classified as the "D" component of Σ 1999, which is because the two systems are also physically moving together through the galaxy."** **Haas** describes the two systems as "XI Scorpii is bright amber yellow and royal blue: STF 1999 is a wide pretty pair of tangerine-orange stars."**** **Stelle Doppie** presents the Lit. for STF 1998 here and STF 1999 here.

Serpens

Struve 2007, SAO 101922, WDS 16060+1319:
Starhop 3°17' SE at 134.9° from Gamma Ser to locate this object is a rather sparse star field. The three stars in STF 2007 form an almost straight line with the primary in the center; the slightly dimmer B is component to the NW and the C component is quite dim at Mag. 10.8 further out to the SE. You may note that the unrelated double star, SAO 101938, Mag. 7.3 with a dim Mag. 10.3 companion slightly over 20' almost is directly east of the system, 87°. You may pick up a couple of field stars to the NW and SW in a 1° FOV, ~80X in the EP. The primary is variable and the Spectral Class is B8III, yellow. I observed the primary as light yellow and the B component as ruddy brown in my EP.*** **John Nanson** discusses the colors of the stars and the possibility that the AB may be physically related here.** **Haas** describes the group as, "60mm. A wide pair with pretty colors – an ideal object for low power. It's a Sun-yellow star with a little red companion."**** **Stelle Doppie** has the Lit. here.

Sextans

Struve 1464, SAO 118433, WDS 10416-0016:
You can slew to this system from 5th Mag. Beta Sex by following a line 2° 50' almost due east at 82.9°. You will observe a three-star object that forms a scalene triangle with the primary at the vertex to the northeast and the D component to the SW at 66", 226°. The AB pair are fairly close at 5.8" although the Δ Mag. is 2 which may be buried in the glare of the primary:110X at the EP should separate the two at a P.A of 302° Almost due west at 6' 13" distance of the trio is Mag. 7.5 SAO 137725 which anchors the group in the FOV. The primary is variable and the Spectral Class is F6V, yellow-white. The Mags. at 8.2, 10.2 and 10.5 should be observable with a small scope in good conditions.*** **Stelle Doppie** has the Lit. here.

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Taurus

STFA 8, Alcyone, 25 Tau, SAO 76199, WDS 03475+2406:
This is a prominent and quite famous multiple star in the middle of the Pleiades. The primary appears as a lone star with a lot of nebulosity consisting of an almost equilateral triangle of decreasing magnitude stars to the NNW of it. The group is embedded in a rich star filed with blue luminosity with Pleione and Atlas to the east and Marope to the WSW. There are eight stars in this system plus some binaries close to some of the group. The 15th Mag. E and the 13th Mag. F components bay be out of reach of most optics. The primary is variable and has a Spectral Class is B7III, blue-white.*** **Stelle Doppie** has the Lit. here.

STFA 7, SAO 75964, WDS 03311+2744 & Struve 401, SAO 75970, WDS 03313+2734:
What we have here is a double-double formed by the AB components of both STFA 7 and Struve 401. Slew 5° 01' from Alcyone almost due NW at 314.5° to locate these objects. At a relatively low power with a FOV of about 0.5°, the two systems should be easy to observe in a sparse star field. There are three stars in STFA 7. The AB pair are physical. The B component is to the SW of the primary and it has a dim Mag. 13 C companion directly north of it 12.2" away which will require superb optics to glean from the glare of its partner. There are also three stars in Struve 401. The B companion, almost due west, is Mag. 6.8, (equal Mag. to the primary), and the C component at Mag. 13.4 is over 263", (about 4' 23"), to the SE at 129°. This AB pair are also considered physical. The Spectral Class of the STFA 7 primary is B9, blue-white and the STF 401 primary is A2V, white. ***John Nanson has a description of STF 401 in his WordPress blog here.** **Stelle Doppie** has the Lit. for STFA 7 here and for Struve 401 here.

Triangulum

Struve 258, BU 876, SAO 55512, WDS 02239+3330:
Slew 1°, 24' east at 103° from Gamma Tri to center this object in your eyepiece. This is a four-star system with a tight AB pair, BU 876, and a close CD pair, STF 258 off to the SSE that looks like a double-double. Identify the brighter AB pair to the NNW and the dimmer, not-so-tight CD pair off to the SSE. You will need considerable power to split the AB pair. *** The primary has a Spectral Class of A0, white. **Stelle Doppie** has the Lit. here.

Ursa Major

36 Uma, LDS 2863, SAO 27670, WDS 10306+5559:
Starhop 4° 21' almost due west at 268° from Merak, Beta Uma, to locate this object. A closer object to assist locating this system is 37 UMA. Slew 1° 16' at 210°, SSW. This is a wide triple forming an almost straight line or an open obtuse triangle from the primary on the east end, NW to the B component and NNW to the C component further out. Low power, ~110X, (9° FOV), is about all you'll need to observe this wide triple. The AB pair have been determined to be physical. The Spectral Class of the primary is F6V, yellow-white.*** **John Nanson** covers this system in his WordPress blog here.** **Stelle Doppie** has the Lit. here.

Struve 1830, and Struve 1831, SAO 29074, WDS 14161+5643:
Here is an intriguing double-double that shares a common C component! Slew 7° 28' from Mizar, Zeta Uma, and almost due east at 71° to locate this object. The two systems should easily resolve at low power in about 0.5° FOV. You may try to power up to over 300X to get a good split on the AB pair of STF 1830 to the NE. It may be confusing to identify the components of these two systems. Consider STF 1831 as A, B, C and D. STF 1830 as C, (shared with STF 1831),E,F and G. The Spectral Class of the STF 1830 primary is F8V, yellow-white; of STF 1831 is A7IV, white. *** **Haas** describes the AB pair of STF 1831 as, "125mm: Beautiful view. A bright white star almost touching a little smokeball."**** **Stelle Doppie** has the Lit. for STF 1830 here and STF 1831 here.

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Struve 1691, SAO 28561, WDS 12550+5810:
Slew almost due north at 3.3°, 2° 12' from Alioth, Epsilon Uma, to center this object in the eyepiece. The trio forms an almost straight-line east to west with the primary inside and close to the B component in a sparse star field. The AB pair should split at relatively 110X, 1° FOV. The Spectral Class of the primary is F0IV, yellow-white. The AB pair are considered physical and **Stelle Doppie** has the Lit. here.***

Struve 1415, SAO 7099, WDS 10178+7104:
Slew 10° 20' NNW, 338.9°, from Alpha UMa, (Dubhe), to center this object in the eyepiece. At 130X, you will see a fine three-star system with a field star to the east and another to the southwest. The AB pair are considered physical but not orbital. There is a 10 Mag. TYC field star to the east of the AB pair. The primary is variable and the Spectral Class is A7m, white. *** **Haas** describes the AB pair as, "Grand sight! A bright star with a wide companion in the pretty combination of sum yellow and pearly white. Smyth: A pretty but minute object."**** **Stelle Doppie** has the Lit. here.

Vulpecula

Struve 2521, SAO 104839, WDS 19265+1953:
This object can be found in the Coathanger Cluster, Collinder 339. Slew just over 4° 48' almost due south from 6 Vul, (Anser), at 186.3° to find this object in the cluster. The object forms a triangle including 4 and 5 Vul. You may get 5 Vul in your FOV with this object at low power, FOV 0.5°. The AB pair are considered physical by proper motion although at 1310 LY distance, the wide separation of the two makes an orbit a little unlikely. The Spectral Class on the primary has been determined to be K5III, yellow-orange, I got an amber-gold hue and a silver blue B component when I observed the system in October, 2015. *** **Haas** describes the AB pair as, "This star forms the bend of the hook in the Coathanger asterism. Smyth: A very delicate double star…topaz yellow; deep blue."**** **John Nanson** covers the system, noting that there is E component at Mag. 14.5, in his WordPress blog here.** **Stelle Doppie** has the Lit. here.

Orbital Pairs

STF 42, STF 3056, STF 2379, STF 2944 AB, STF 2944 AB, STF 711, BU31, STF 1169, STF 1300, STF 262, STF 1964, STF 269, STF 1769, STF 2579 AB, STF 518 BC, STF 982, STF 1110 AB, STF 2052 AB, STF 2799, RHO OPH, STF 3060, HJ 5000, MLO 4, STF 1998, STF 815, STF 875 AB, JC AC

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