

The Eldorado Star Party

2021 Telescope Observing Club

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Purpose and Rules

Welcome to the Annual ESP Telescope Club! The main purpose of this club is to give you an opportunity to observe some of the showpiece objects of the fall season under the pristine skies of Southwest Texas. We have also included a few items on the observing lists that may challenge you to observe some fainter and more obscure objects that present themselves at their very best under the dark skies of the Eldorado Star Party.

The rules are simple; just observe the required number of objects on the observing list while you are at the Eldorado Star Party to receive a club badge.

Ride ‘Em Cowboy

Saddle up and hold on tight, “**Ride ‘Em Cowboy**” is the Telescope Observing Club Program for ESP 2021. The program is a list of 29 objects located in the constellations Capricorn, Equuleus, Pegasus, Taurus, and Monoceros. Okay, I can hear the snarky comments now. “Real cowboys don’t ride a goat” and of course “Real cowboys don’t ride a unicorn!” But Capricorn is an awfully big goat in the southern sky and Monoceros, although a collection of dim stars, occupies 482 square degrees of the sky. Also, both of these constellations contain some of the toughest objects to observe on this year’s list. So hold the reins tight and don’t let these objects buck you off!

You only need to observe **22 of the 29** objects on the list to qualify for the ESP Telescope Observing Club badge. But do try and corral as many of the objects on the list as you can. You might have to stay up late or get up real early to snatch a few of them from that darn pesky unicorn!

Previous ESP Observing Clubs

Please note that all previous observing programs offered at ESP from 2004 onward are still available. Club badges from these earlier programs (*with the exception of 2009 - Texas Hash*) are also available and will be awarded to anyone completing them at ESP. Check the Eldorado Star Party website at www.eldoradostarparty.org to select one (or more!) of these observing lists.

Club Badges

Any size telescope or binocular can be used to complete the observing programs. Again, all observations must be made at the Eldorado Star Party in order to qualify for an ESP observing badge. To receive your badge, please turn in your observations to Bill Flanagan any time during ESP. I will try to be available on the observing fields as well as in the Lodge prior to the meals and talks. If you finish the list on the last night of ESP, or I am not available to give you your badge, just mail a copy of your observations to me at 815 Azalea, Houston, TX 77018, and I will send you your badge.

Good Luck and Good Observing!

Ride 'Em Cowboy

| Primary ID | Alternate ID | Type | Con | RA 2000 | Dec 2000 | Mag | Size | Distance | Date | Time |
|-------------------|--------------------------|-------|-----|-----------|------------|-----------|------------|------------|------|------|
| Alpha Cap | Alpha-1 / 2 Cap | Mstar | Cap | 20h17m50s | -12°31'43" | 4.3 / 3.6 | | 690/110 ly | | |
| Sigma Cap | 7 Cap | Doub | Cap | 20h19m24s | -19°07'07" | 5.3 | | 1100 ly | | |
| NGC 6907 | H III 141 | Gal | Cap | 20h25m06s | -24°48'30" | 11.9 | 3.5'x 2.6' | 140 Mly | | |
| Epsilon Equ | 1 Equ | Mstar | Equ | 20h59m04s | +04°17'33" | 5.2 | | 180 ly | | |
| NGC 7015 | MCG 2-53-12 | Gal | Equ | 21h05m37s | +11°24'51" | 13.2 | 1.7'x 1.5' | 220 Mly | | |
| Gamma Equ | 5 Equ | Mstar | Equ | 21h10m21s | +10°07'50" | 4.7 | | 118 ly | | |
| M 30 | NGC 7099 | Glob | Cap | 21h40m22s | -23°10'42" | 6.9 | 12.0' | 27,000 ly | | |
| Palomar 12 | | Glob | Cap | 21h46m39s | -21°15'06" | 11.7 | 2.9' | 64,000 ly | | |
| Struve 2877 | SAO 107756 | Doub | Peg | 22h14m18s | +17°11'20" | 6.5 | | 400 ly | | |
| Stephan's Quintet | Hickson 92 | GalCl | Peg | 22h36m00s | +33°57'57" | 12.0 | 3.2' | 270 Mly | | |
| NGC 7331 | H I 53 | Gal | Peg | 22h37m04s | +34°24'59" | 10.2 | 9.1'x 3.4' | 40 Mly | | |
| Eta Peg | 44 Peg | Mstar | Peg | 22h43m00s | +30°13'16" | 3.0 | | 210 ly | | |
| NGC 7448 | Arp 13 | Gal | Peg | 23h00m04s | +15°58'49" | 12.1 | 2.3'x 1.0' | 80 Mly | | |
| NGC 7457 | H II 212 | Gal | Peg | 23h01m00s | +30°08'41" | 11.9 | 3.9'x 2.2' | 43 Mly | | |
| NGC 7479 | H I 55 | Gal | Peg | 23h04m57s | +12°19'22" | 11.7 | 3.7'x 2.8' | 105 Mly | | |
| 57 Peg | GZ Peg | Mstar | Peg | 23h09m31s | +08°40'38" | 5.1 | | 780 ly | | |
| Hickson 93 | | GalCl | Peg | 23h15m24s | +18°58'59" | 12.0 | 9.0' | 200 Mly | | |
| NGC 7678 | Arp 28 | Gal | Peg | 23h28m27s | +22°25'14" | 12.5 | 2.1'x 1.5' | 160 Mly | | |
| NGC 7741 | H II 208 | Gal | Peg | 23h43m54s | +26°04'34" | 11.8 | 3.8'x 2.5' | 41 Mly | | |
| NGC 7743 | H II 256 | Gal | Peg | 23h44m21s | +09°56'02" | 12.4 | 2.8'x 0.7' | 65 Mly | | |
| NGC 7772 | OCL 230 | Open | Peg | 23h51m46s | +16°14'48" | 11.0 | 3.0' | 4,900 ly | | |
| NGC 7814 | Little Sombrero | Gal | Peg | 00h03m15s | +16°08'42" | 11.0 | 4.9'x 2.1' | 40 Mly | | |
| NGC 1514 | Crystal Ball Nebula | PNe | Tau | 04h09m17s | +30°46'33" | 10.8 | 2.0' | 2,300 ly | | |
| NGC 1615 | MCG 3-12-5 | Gal | Tau | 04h36m02s | +19°57'03" | 12.0 | 1.4'x 0.7' | 150 Mly | | |
| M 1 | Crab Nebula | Neb | Tau | 05h34m30s | +22°01'00" | 8.4 | 8.0' | 6,500 ly | | |
| NGC 2245 | LBN 904 | Neb | Mon | 06h32m42s | +10°09'00" | 11.0 | 3.0'x 2.0' | 8,000 ly | | |
| NGC 2261 | Hubble's Variable Nebula | Neb | Mon | 06h39m10s | +08°45'00" | ~10 | 2.2'x 1.5' | 3,000 ly | | |
| NGC 2264 | Christmas Tree | Open | Mon | 06h40m58s | +09°53'42" | 4.1 | 39.0' | 2,200 ly | | |
| NGC 2301 | Collinder 119 | Open | Mon | 06h51m45s | +00°27'36" | 6.3 | 14.0' | 2,800 ly | | |

Ride 'Em Cowboy – Observing List Notes

Alpha Cap A naked eye double star on the NW tip of Capricornus. The two stars of this naked eye double are actually an optical pair located at different distances from us. The brighter southeastern star, Alpha-2, shines at magnitude 3.6 and is 110 light years distant. About 6' to the northwest of Alpha-2 is Alpha-1 shining at magnitude 4.3. It is some 690 light years distant from us. However, through the telescope both of these naked eye stars will reveal themselves as true gravitationally bound multiple stars. Alpha-1 has 5 components of which 4 are visible in the telescope. The C component is easy, shining at magnitude 9.6 about 46" to the SW of the bright A component. The B and D components are a dim close pair (magnitude 14) located about 44" south of A. They are only 2" apart and may be difficult to split unless the seeing permits. The E component is only 0.6" from the A component and probably can't be split in the telescope. Alpha-2 has 4 components. At magnitude 9.5, the D component is easy to see 2.6' to the SSE of Alpha-2. Closer in at 6.6" and to the south of the A component is the close BC pair. They both shine at around magnitude 11 and with only 1.3" separating them they will be difficult to split. If the seeing permits, try to use high power to see if you can split these two stars.

Sigma Cap A pretty double star with some color contrast about 1100 light years from us. The primary is bright at magnitude 5.3 and glows with an orange tint. The companion is directly south, 56" from the primary, and glows with a blueish white tint at magnitude 9. Sigma Cap is a K-type giant star that has exhausted its supply of hydrogen and has swollen to a diameter that is 68 times larger than the diameter of our Sun. Its mass is 6.3 solar masses and its luminosity is about 1,400 times that of our Sun.

NGC 6907 A barred spiral galaxy located in Capricornus about 140 million light years away. In a 14" telescope at 186x, the bar can be seen with averted vision running E-W. The galaxy does not show much core concentration. Two arms are visible, one on the east and one on west end of the bar. The arm on the east is the most obvious where a dark notch makes it more visible. It curves north from the end of the bar. If you have a large aperture telescope, see if you can detect a bright spot in the eastern arm just next to the notch mentioned above. This is actually another galaxy, NGC 6908, which is a lenticular galaxy that passed through the disk of NGC 6907 about 35 million years ago.

Epsilon Equ A nice double star with some color contrast about 180 light years from us in Equuleus. The primary is magnitude 5.3 and is yellowish white. The white/blue secondary is magnitude 6.4 and is located about 10.5" ENE from the primary. They have an orbital period of 101.5 years. The primary is also a double star but is currently at periastron and its two components are separated by only 0.18".

NGC 7015 A face on spiral galaxy in Equuleus located some 220 million light years from Earth. In a 14" scope it appears as a small round dim smudge about 1' in diameter. It shows some core concentration. There is a dim magnitude 14.5 star located just on the SSE edge of the galaxy.

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Gamma Equ A multiple star in Equuleus about 118 light years distant that has 4 component stars. Three out of the four components are visible in most amateur telescopes. The two brightest components are widely separated by 5.6' and relatively bright at magnitudes 4.7 and 6.0. The C component is much dimmer at magnitude 12.6 but can be seen just 47" north of the primary.

M 30 Located in the constellation Capricornus, the globular cluster M 30 is about 27,000 light years distant. It is sometimes referred to as "The Goat Cluster" and you can definitely see why. Extending off to the NE from the body of the cluster are two strings of stars that bear a resemblance to the horns of a goat as if you were looking at the goat head on. The body of the cluster forms the face of the goat and the concentrated core is the nose. The great globular M 22 in Sagittarius has two similar tentacles, but M 30 looks more goat-like and of course it is in the goat constellation! There are lots of resolved stars extending out to a diameter of about 10'. The core of M 30 has some concentration and appears to be slightly offset from the center to the NNE.

Palomar 12 A dim globular cluster located in Capricornus about 64,000 light years from Earth. Palomar 12 is one of the challenge objects on the list. It has a very low surface brightness but is visible in moderate sized telescopes using averted vision. Once you locate the field, there is a small asterism of three 11th magnitude stars arranged in a right triangle just off the SSE edge of the cluster. Find this asterism and then use averted vision to locate Palomar 12. Also, try the trick of tapping the telescope to wobble it slightly and see if that helps the cluster pop into view from the background glow. When it was first discovered, Palomar 12 was found to be much younger than the other globular clusters in the Milky Way. Later it was determined that the Milky Way actually ripped Palomar 12 from its parent galaxy, the Sagittarius Dwarf Elliptical Galaxy, about 1.7 billion years ago!

Struve 2877 Located in the constellation Pegasus, Struve 2877 is a pretty color double star that is about 400 light years from us. The primary is yellow in color and shines at magnitude 6.5. The secondary is magnitude 9.5, has a blueish color, and is located 22" from the primary in the NNE direction.

Stephan's Quintet A compact group of 5 galaxies located in the constellation Pegasus. Four of the group, NGC 7317, 7318A, 7318B and 7319 are at distances between 210 and 340 million light years. They are gravitational bound, interacting with each other and will probably merge with each other at some point in the future. The fifth galaxy, NGC 7320 is a foreground galaxy about 40 million light years distant. At 186x in a 14" telescope, the group will initially show as four elongated smudges of light in the eyepiece. Three of them form a triangle about 1.5' on each side. NGC 7320 is located on the SE corner of this triangle and is the largest and brightest galaxy in the field. The smudge on the northern tip of this triangle is actually 2 galaxies, NGC 7318A and 7318B. If seeing permits, use high power and averted vision to see if you can detect that this smudge of light is actually composed of two faint blobs which comprise the pair of galaxies NGC 7318A & 7318B. NGC 7317 is located on the SW corner of the triangle. There is a mag 13 star just north of 7317 which tends to make it look like a

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double. If you follow a line that runs from 7317 through 7318A/B and continue another 1.5' past 7318A/B, with averted vision you should find a small faint glow of light. This is NGC 7319 and is probably the hardest member of the galaxy group to detect.

NGC 7331 NGC 7331 is a fine spiral galaxy about 40 million light years from Earth. It is elongated, 8' x 3' in size, and oriented mostly NS. The core is prominent and appears stellar at the center. There is some mottling in the glow of the galaxy and perhaps a hint of a dust lane on the SW side. In a 14" telescope, three faint galaxies, NGC 7337, 7340, 7335 can also be seen with averted vision. They are located on the east side of 7331 and are arranged in a triangular pattern. There is a fourth smaller and dimmer galaxy, NGC 7336, that is also located on the east side of 7331 just north of the triangle composed of 7337, 7340 and 7335. These four galaxies are often referred to as the "fleas". Although they appear to be associated with NGC 7331, the fleas are actually background galaxies located some 300 million light years away from us.

Eta Peg A nice bright multiple star located in the constellation Pegasus about 210 light years from Earth. There are actually 6 stars in this system of which 3 can be easily seen with a 14" telescope. The primary is magnitude 3 and yellow in color. The B companion is located about 1.5' NNW from the primary and glows at magnitude 9.8 with a blueish tint. The 10th magnitude C companion is only 0.20" from the B companion which makes the BC pair virtually impossible to split. The D companion glows at magnitude 14 and is also visible in the 14" as a tiny prick of light located about 2.5' NNW of the primary. There is also the E companion at magnitude 16 located just 5.7" south of the D companion. You will probably need large aperture and good seeing to catch a glimpse of the E companion.

NGC 7448 A spiral galaxy about 80 million light years distant located in the constellation Pegasus. In a 14" telescope it will show as a fairly bright but small elongated oval running mostly N-S and centered between a 10th magnitude star 2.5' to the east and a 11th magnitude star 4.3' to the west. It appears to be about 2' x 1' in size, with a somewhat uniform surface brightness and not much core concentration. The northern end appears to curve down slightly to the west. NGC 7448 is part of a galaxy group. If you sweep 27' to the east of 7448 you will come to three other members of the group, NGC 7463, 7464 and 7465. An additional member, NGC 7454, can be found 28' to the northeast of NGC 7448.

NGC 7457 A lenticular galaxy in the constellation Pegasus about 43 million light years distant. In moderate sized telescopes it shows as an elongated smudge of light about 3.5' x 1.5' oriented in the NW-SE direction. Averted vision shows the core to be somewhat concentrated but not stellar. It's hanging out with a neat little collection of 9th and 12th magnitude stars arranged in a chain running ENE to WSW. If you are observing with a large aperture telescope see if you can find the galaxy UGC 12311 in the same field of view located just 7.9' to the northeast of 7457. The magnitude of UGC 12311 is listed as 15.2(blue).

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NGC 7479 A barred spiral galaxy in the constellation Pegasus about 105 million light years from Earth. It is classified as a Seyfert galaxy and is undergoing intense star formation. NGC 7479 is a nice example of a barred galaxy. The bar is obvious in a moderate size telescope. The galaxy is elongated in the NS direction about 3' x 2' in size, with the bar running N-S in the center of the halo. Averted vision clearly shows two arms on the north and south ends. The arm on the south end of the galaxy arcs westward and then northward. The arm on the north end is broader and dimmer, arcing eastward and then to the south.

57 Peg Located in the constellation Pegasus about 780 light years away, 57 Peg is a pretty double star with fairly good color contrast. The bright primary is yellow/gold and shines around magnitude 5. It is actually a variable star whose brightness varies between magnitude 4.65 and 5.23 with a period of about 93 days. The secondary is significantly dimmer at magnitude 10 and is white/blue in color. It is located about 32" to the south of the primary.

Hickson 93 A compact group of 5 galaxies in the constellation Pegasus. Four of these galaxies, NGC 7550, 7549, 7547 and 7553, are about 200 million light years from Earth and appear to be gravitationally bound to each other. The fifth, NGC 7558, is actually a background galaxy about 400 million light years distant. A moderate size telescope should be able to show the 3 brightest members of the group, NGC 7550, 7549 and 7547. They form a right triangle, the N-S side of which is about 5' long. NGC 7549 is at the northern tip of this triangle and with averted vision it shows as a thin wisp of light, elongated N-S that is just 1.5' east of an 11th magnitude star. Large aperture scopes may show the barred spiral structure of this galaxy. NGC 7550 is 5' to the south of 7549 and is a round glow about 1' in diameter. NGC 7547 is 3.5' to the west of 7550. It is dimmer and elongated about 1' x 0.5' in the E-W direction. The other two members NGC 7553 and NGC 7558 are located to the east of the 3 brighter members. Both are dim, listed near 16th magnitude, and are hard to detect in small and moderate sized telescopes.

NGC 7678 A face on spiral galaxy about 160 million lights year from us in the constellation Pegasus. It is nestled within a neat little triangle of 11th and 12th magnitude stars. It has a mostly round shape of about 2' in diameter with a faint concentrated core. In a 14" telescope using averted vision, the arm on the southern side of the galaxy sometimes pops into view. The triangle asterism of stars that frames the galaxy makes it both interesting and easy to find.

NGC 7741 A face on barred spiral galaxy in the constellation Pegasus. NGC 7741 is located about 41 million light years from Earth. It will show first as a dim glow of light about 2.5' in size. If the seeing is good, the bar structure will be easy to detect as a linear concentration of light running E-W through the center. Larger aperture scopes should show the arms extending north and south off the east and west ends of the bar. The galaxy is nicely positioned next to a 9th magnitude double star to the NNW and an 11th magnitude star to the ESE.

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NGC 7743 A galaxy located in the constellation Pegasus about 65 million light years from us. It has a mostly round shape about 1.5' in diameter with a moderately concentrated core that appears stellar at the center. It is located on an interesting chain of seven magnitude 10 to 11 stars running NE-SW through the field.

NGC 7772 An open cluster in Pegasus about 4,900 light years distant, NGC 7772 is an interesting little grouping of about 7 stars of magnitudes 11 through 14. They are arranged in a triangular shape about 3' in size. It resembles a small Christmas tree or an arrow pointing north. NGC 772 is often cataloged as an open cluster. However in 2018, astrometric data from the Gaia space telescope showed that the group is actually an asterism of unrelated stars.

NGC 7814 Located in Pegasus about 40 million light years away, the galaxy NGC 7814 should be relatively easy to find. It is a spiral galaxy that is oriented edge-on to us and is quite often called the “Little Sombrero” for the resemblance that it has to M 104, the “Sombrero Galaxy”. NGC 7814 has an oval shape about 3.5' x 2' oriented NW-SE. The core is bright but not stellar and appears as a bulge in the center of the galaxy. Averted vision should show a thin dark lane running through the center. A straight line of six dim 13th to 14th magnitude stars runs NE- SW on the east side of the galaxy making for an interesting field.

NGC 1514 The Crystal Ball Nebula is a planetary nebula in the constellation Taurus at a distance of about 2,300 light years from Earth. In the eyepiece, it first appears as a dim round glow with a star embedded in the center. The bright magnitude 9.5 central star dominates the nebula. Without a nebula filter the central star shines brightly with a thin, subtly glowing sphere surrounding it. With a UHC filter, the nebula is more visible and begins to show some detail. The surface brightness of the nebula is uneven and has a somewhat mottled appearance.

NGC 1615 Located in the constellation Taurus, NGC 1615 is an elliptical galaxy about 150 million light years from Earth. In the eyepiece it appears as a dim small round glow of light about 1' in diameter. There are two bright stars of magnitude 6.3 and magnitude 7.2 located about 6' to the west that form an equilateral triangle with NGC 1615. There are also two dimmer 12th magnitude stars about 6' to the east and all 5 objects resemble a bow tie with 1615 being the knot of the bow tie. With averted vision NGC 1615 appears to show some core concentration.

M 1 The “Crab Nebula” is the famous supernova remnant located in Taurus about 6,500 light years from us. It is the expanding cloud of stuff cast off from a supernova explosion that was actually observed and recorded by Chinese astronomers in 1605. The records they made indicate that the supernova was so bright that it could be seen in the daytime. M 1 is very easy to sweep up in a small telescope. It has a somewhat rectangular shape about 6' x 4' oriented in the NW-SE direction. Even without a nebula filter the surface is mottled in a manner suggesting filaments. Wisps of light make the edges of the rectangle hard to define. Spend some time observing this object and use a UHC or OIII filter to bring out the filament structure of this nebula.

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NGC 2245 This reflection nebula is in the constellation Monoceros is about 8,000 light years from Earth. It is located just 2' SW of a magnitude 7.6 star. The nebula has a fan shape to it, somewhat like a comet, with the fan opening to the southwest. There is an 11th magnitude star embedded in the nebula which is providing the light that illuminates the nebula. This star is actually part of a binary system, the primary star of this binary being the magnitude 7.6 star just next to the nebula to the NE.

NGC 2261 Hubble's Variable Nebula is both an emission and reflection nebula surrounding the erratic variable star R Monocerotis. The brightness of the nebula changes by as much as 2 magnitudes. Edwin Hubble discovered the variability of the nebula in 1916 in a series of photographs. It is also famous for being the first object photographed by the 200" Hale Telescope in 1949. It has a wedge or comet-like shape about 2' in size. The nebula fans out to the north from R Monocerotis which is located in the tip of nebula. On nights of good seeing, observing with high powers will show details and dark markings in the nebula. Nebula filters like the UHC or OIII will also aid bringing out some of these markings.

NGC 2264 The "Christmas Tree Cluster" can be found in the constellation Monoceros. The distance to NGC 2264 is about 2,200 light years. It is a collection of around 20 bright stars spanning about a half degree in the sky. They are arranged in the shape of a Christmas tree. The top of the tree points south and there is a bright 5th magnitude star on the north side of the cluster marking the trunk of the tree. Many dimmer stars accompany the bright stars outlining the Christmas tree. There is also an extensive network of nebulosity associated with NGC 2264. The "Cone Nebula" is located just off the tip of the tree. Try using either a UHC or OIII filter to see if you can detect the dark notch of the "Cone Nebula" and the extent of the faint nebulosity surrounding the cluster.

NGC 2301 An open cluster located in the constellation Monoceros about 2,800 light years distant. NGC 2301 is a rich open cluster with about 80 member stars. The brightest members of the cluster form a distinctive distorted "Y" pattern about 20' in size and oriented N-S in the sky. The "Y" is bent towards the east. The brighter stars of the cluster show colors varying from a golden to blueish hue. Make sure you stay up late or get up early and catch this beautiful cluster when it is near the meridian.