

Government of Aosta Valley, the Town Administration of Nus, the Mont-Emilius Community, the high school students of the Istituzione scolastica di istruzione scientifica e magistrale 'Binel-Viglino' in Pont Saint- Martin and Saint-Vincent with their teachers, Professor Maril'u Lupi and Professor Silvana Dondoni.

### References

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- Cenadelli, D, et al, 2009. *An international parallax campaign to measure distance to the Moon and Mars*. Eur. J. Phys. **30**, 35 – 46. ☆

## seeing double



### *Double Stars in Scorpius*

by Lucas Ferreira

#### Introduction

As the acting director of the Double Star Section, I look forward to working with many of you and wish to take this Section back to the forefront of amateur observational astronomy in South Africa. I would therefore like to invite all those interested in observing double stars to contact me, so that we may share information and learn from one another and continue to submit as many observations as we can. From time to time I would like to publish reports and information on double stars on the ASSA website and in *MNASSA*. Your feedback on these articles will be greatly appreciated.

#### Doubles in Scorpius

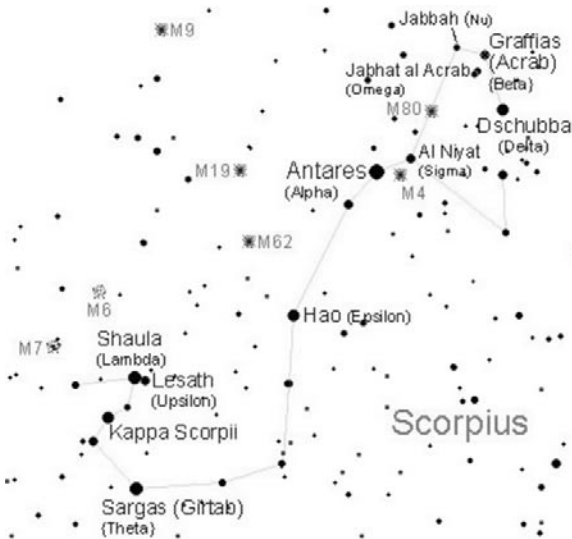
The arrival of the constellation of Scorpius in our southern skies heralds in another winter. This constellation will

be visible for the whole of winter and it contains many interesting double and multiple stellar systems. It is one of the few constellations that bears a resemblance to the object after which it is named. In mythology, Scorpius was the scorpion whose sting killed Orion. In the sky Orion still flees Scorpio – as Orion sets below the horizon, Scorpius rises. Scorpius is the eighth zodiacal constellation and the ecliptic passes through its extreme north-western corner. This selection is a mix of easy and challenging double stars. The skymap on p.120 will help you locate them and the table on p.122 gives their technical details, obtained from the *Washington Double Star Catalogue*.

#### The heart of the Scorpius

Scorpius' heart is marked by the brilliant orange-red Antares ( $\alpha$  Scorpii). Antares means the "rival of Mars" (Ares). **Antares** is a red supergiant, spectral type M1, located 550 light years away and about 700 times the diameter of the Sun. It has a close magnitude 6 blue

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**Skymap showing the location of some of the double stars described in this article.**

companion that is rather difficult to see. Antares B is of spectral type B2.5 at a separation of about 2.9 arc seconds from Antares A, or 550 AU (Astronomical Units) at Antares' known distance. Its position angle (PA) is estimated to be 274 degrees. At magnitude 5.5, visually it is only 1/370th as bright as Antares A, even though it shines with 170 times the Sun's luminosity. It is normally difficult to see in small telescopes due to Antares' glare, but becomes easy in apertures over 150mm (6-inch). The companion is often described as green, but this is probably a contrast effect due to the strong redness of its bright primary neighbour. Antares B can be observed with a small telescope for a few seconds during lunar occultations while Antares

itself is hidden by the Moon; it was discovered during one such occultation on 13 April 1819. Magda Streicher successfully split Antares A & B in May 2005. She used a 12-inch S/C Telescope at 346x magnification. Her trick here was to use a normal green filter and to observe Antares shortly after sunset, before it reached its full brightness. She said that this was no easy task due to Antares' brightness overwhelming the fainter companion. A stable atmosphere is also crucial to achieve this.

### Other Double Stars in Scorpius

**Omega 1,2 Scorpii** - mag 4.0 and 4.3, sep. 15 arcminutes (see picture). While waiting for your telescope to cool down, maybe take a look at the naked-eye pair, omega 1,2 Scorpii, situated a degree south of beta Scorpii. Omega Scorpii consists of a blue-white star and a yellow giant. These fourth-magnitude stars, about as far apart as the Mizar-Alcor pair in Ursa Major, are a nice sight in binoculars.

**Beta Scorpii** - mag 2.6 and 4.5, sep. 13.6" One of my favorite double stars is beta Scorpii. It is an easy split in a 60mm refractor or any small telescope. Beta Scorpii is also known by its common name of Acrab. In a telescope one should



**This picture of Omega Scorpii is a 30 sec exposure @ ISO 400 taken with my Pentax K110D SLR on my 200mm (8-inch) F/5 Newtonian Telescope. Photographed on 18 May 2009.**



**Nu Scorpii in a 30sec exposure @ ISO 400 taken on 18 May 2009 with the same equipment as before.**

expect to see a white primary star with a blue to blue-green companion. They are both hot B-class stars, at least 10 times as massive as our Sun, with short lives. Both are expected to end their stellar evolution in massive supernovae. Beta-1 Scorpii, the brightest of the pair, has another companion 0.5 arcseconds, or about 80 AU, distant. Furthermore, both Beta-1 Scorpii and Beta-2 Scorpii are themselves thought to be spectroscopic binaries, bringing the total number of stars in the system to five. Thus, the system you're seeing in the eyepiece is actually quintuple! One can only imagine the view of the sky from a planet embedded within such a system!

**Nu Scorpii** - mag 4.2 and 6.6, sep. 40.8" (see picture). Like Epsilon Lyrae, Nu Scorpii is a brilliant double-double. But unlike the former, it is much better positioned for us here in the southern hemisphere. Small-scope owners using 50-power will see a wide pair... but wait! If the seeing is good and you increase the power to about 120x, you'll spot a magnitude 7.2 star just 2.4" from the fainter component. I can easily split it with my 8-inch telescope at 200-power by using a 2x Barlow lens and a 10mm Plossl eyepiece. The magnitude 4.2 primary is also not alone, but you'll need at least a 12-inch telescope and more than 200-power to bridge the 1.2" gap separating it from its magnitude 5.3 partner. Unfortunately I was unable to split these two due to insufficient aperture of my telescope. Remember, with such a small separation between double stars,

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good weather and a stable atmosphere is of utmost importance. Since it is near the ecliptic, Nu Scorpii can be occulted by the Moon and very rarely by planets. Mercury occulted it on 14 December 1821, but will not do so again until 2 December 2031. The previous occultation by Venus took place on 27 December 1852 and the next one will be on 30 December 2095. On 29 July 1808 it was occulted by Neptune.

**Sigma Scorpii** - mag 2.9 and 8.4, sep. 20.0" (see picture). Also named Al Niyat, Sigma Scorpii is about 735 light years from the Sun. Easily found just 2 degrees east and slightly north of Antares, this pretty duo is an easy target in small scopes at 50-75 power. Try averted vision if the magnitude 8 companion proves elusive.

A thought: There is so much beauty in double stars and people are so used to only looking at deep-sky objects like nebulae, clusters and galaxies. Double stars are unique with beautiful colours and do not

require the use of large scientific instruments to be observed. I hope that this will be the start of many double stars we will be observing the beauty of together! Happy double stargazing... ☆

### References:

Wikipedia, The free Encyclopedia  
The Washington Double Star Catalogue



**Sigma Scorpii** after a 30 sec exposure @ ISO 400, taken 18 May 2009.

Star	RA (J2000.0)	Dec	PA	Sep.	Epoch	Mag.
Beta Sco	16 <sup>h</sup> 05 <sup>m</sup> 26 <sup>s</sup>	-19°48'19"	20°	13.6"	2003	2.59, 4.52
Omega 1	16 06 48	-20 40 09	145	877"	2000	3.95
Omega 2	16 07 24	-20 52 07	145	877"	2000	4.32
Nu Sco	16 12 00	-19 27 38				
Aa - B			2	1.3"	2003	4.35, 5.31
Aa - C			337	40.8"	2003	4.21, 6.60
CD			54	2.4"	2003	6.60, 7.23
Aa			165	0.1"	1989	4.01
Sigma Sco	16 21 11	-25 35 33	273	20"	1999	2.89, 8.42
HN 39	16 24 40	-29 42 16	358	4.4"	1998	5.89, 6.60
Alpha Sco	16 29 24	-26 25 55	274	2.5"	1997	0.96, 5.4