

March 1987 -Dr Colin Keay

A bright new world....

Just now it is near New Moon and the night sky is at its darkest. This is when observing time on the world's largest telescopes is at a premium. Astronomers are interested in starlight: not scattered moonlight or city lights.

Out in the countryside at the time of New Moon the sky seems ablaze with stars. And in the late summer, when Orion is high in the evening sky, there is a splendid parade of lovely constellations whose brilliant stars fill the mind with wonder.

On the other hand, in areas away from the blaze of the Milky Way, the pitchy black voids between the stars lead one to ponder on the depths of the Universe, and why it is so black.

The great astronomer Johannes Kepler reasoned that if the Universe is infinite, a line of sight in any direction must sooner or later encounter the surface of a star. Nearly two centuries after Kepler, Heinrich Olbers contended that the night sky should therefore appear as bright as the surface of the Sun. The fact that it is not so, is referred to as Olbers' Paradox.

Now, a century and a half after Olbers, some light is being shed on the darkness. At a recent workshop on galaxies, astronomers Tony Tyson and Pat Seitzer, displayed the deepest view of the Universe ever seen. Using extremely sensitive charge-coupled detectors on one of the world's biggest telescopes, their six-hour exposures revealed galaxies down to the 27th magnitude – about a hundred million times fainter than the human eye can perceive and more than ten times fainter than the huge Palomar telescope can detect.

Despite being reddened by the effect of the huge outward velocity related to their extreme distance, the faintest galaxies appear surprisingly blue. Tyson and Seitzer attribute this to an excess of ultra-violet radiation. This in turn means that these faint galaxies must be newborn: not much more than a thousand million (billion) years old!

The galaxies are too faint for their red-shifts to be measured accurately (probably somewhere between 6 and 10) so their distance in light-years is uncertain. If that can be found, add a billion years, and bingo! We will have a good figure for the age of the oldest galaxies.

Returning to Olbers' Paradox: an intriguing feature of the deep-Universe pictures is the crowding of the galaxies. This not only suggests the more compact state of the Universe in its early aeons, but also approaches the state where there is light coming from absolutely every direction. Kepler was right!

However it is incredibly faint light. From the whole celestial sphere it would add up to no more than the light we receive from the brightest star, Sirius. Still a long way from meeting Olbers' hypothesis that it would equal the light of the Sun in all directions.

Breathe easily. Our enjoyment of the beauties of the night sky will not be impaired by the rush of galactic illumination from all corners of the Cosmos. Just moonlight, clouds and light pollution are all we have to worry about. Happily, there are some precious evenings when even they can be avoided.

To cater for the numerous readers who inquire from time to time about the features of the night sky, the WEA is about to commence a course for stargazers on how to recognise the stars and constellations visible from Newcastle. It will run for ten evenings spread over 13 weeks and commences Monday, 23rd of March 1987. See you there!

[some discoveries on Olbers' hypothesis](#)