

Talk-10

Astronomy and Astrophysics from Antarctica

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Abstract

Astronomers have always sought the best locations for their observatories. For many years, high mountains in Chile, Hawaii and other "temperate" locations have been considered to be the best that the Earth can offer. However, over the past decade, measurements on the high plateau of Antarctica have shown that conditions there are better than anywhere else on the planet. New research stations at Dome A (China), Dome C (France/Italy) and Dome F (Japan), together with the existing station at South Pole (USA), offer astronomers an unprecedented view of the cosmos.

The exceptional conditions on the Antarctic plateau result from several factors. It is of course extremely cold (down to -90 C) and very high (up to 4,100 metres) and so the atmosphere is the driest on earth. This leads to the best possible atmospheric transmission, opening spectral windows that are inaccessible from any other location. In addition, the atmosphere is extremely stable and the wind speeds are very low, resulting in less atmospheric turbulence and hence better image quality.

Antarctica also offers a massive volume of pure ice for particle-detection experiments, while the peculiarity of circumpolar stratospheric winds means that research balloons can fly for many weeks at constant altitude to collect data on the cosmic microwave background, cosmic rays, and other fundamental phenomena.

While the costs of operating in Antarctica are high, in many cases it is more cost-effective to conduct a particular experiment there than anywhere else on Earth, or indeed in space.