1. (510).
2. " (511).
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4. ¥Ñ˛¯´â ˘ÑÓѯ´ ÑÕ Õ˙˛˙Ô˝ÑÒ´ fl·-200 ˘Ñ шÔ˙Ó˜´ÕÑÓ¸¸ IceCube (512).

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6. ¢Ö˘ÖÜ˙˙ (520).
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£ 2012 "NÔ×", "", '˙ÖNÑÅ P NÐ' Ù, 'ÒÖÕ¸ ˜ —˙¸˚˜˙˘´——Ñ˙ (511).
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IceCube [34, 35] is an experiment designed to study low-energy neutrinos. It consists of a cubic kilometer of ultra-clear water, surrounded by an extensive array of photomultiplier tubes. The detector is located at the bottom of the South Pole, where the ice serves as a shield against atmospheric neutrinos.

IceCube began operations in 2010 and has been collecting data ever since. It has detected thousands of neutrinos from a variety of sources, including cosmic rays and supernovae. The experiment continues to search for evidence of dark matter and other exotic phenomena.

ANTARES (Astronomy with a Neutrino Telescope and Abyss Enabling Research) is another neutrino observatory located in the Mediterranean Sea. It is a collaboration of physicists from Europe and the United States. ANTARES was commissioned in 2004 and has been collecting data ever since.

DeepCore is a sub-detector of IceCube, designed to improve the sensitivity of the experiment to rare events. It consists of 1450 photomultiplier tubes, placed in a cubic kilometer of water.

AMANDA (Antarctic Muon and Neutrino Detector Array) is a neutrino observatory located at the South Pole. It was commissioned in 1982 and has been collecting data ever since. AMANDA has been upgraded several times to improve its sensitivity to neutrinos.

IceCube and AMANDA are connected by a network of cables, allowing them to share data and improve their collective sensitivity to neutrinos.


‡¸Ô. 6. (£ Ù˜˙Õ˙Ñ—˛´Ì—.)‡Ñ˜ˇ˙ÔÕ—´â —˙ˆ˙Ô—´â˝´ÓÕ´˘˜¸ÉÖܸØÔâ ˜˜˙ÓØ ˇÆÑ— ј, ˚´Ó˙¯¸ÔÕÓ¸Óј´——ÞØ ˘˙Õ˙˝ÕÑÓ´ˇ¸ AMANDA ¸ fl·-200 (“N ON-ν-” 2005’).
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High-energy neutrino astronomy: a glimpse of the Promised Land

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In 2012, physicists and astronomers celebrated the hundredth anniversary of the detection of cosmic rays by Viktor Hess. A year later, in 2013, the first evidence for extraterrestrial high-energy neutrinos emerged, promising fundamental insight into the origin of cosmic rays. The evidence was obtained from the data from the IceCube neutrino telescope at the South Pole. When the idea of this telescope was first discussed at the 1973 International Cosmic Ray Conference, it was beyond anyone’s imagination that it would take biblical forty years before the first discoveries would be made and the Promised Land of the high energy neutrino would be glimpsed. This paper sketches the development towards really sensitive detectors, describes the latest results from the IceCube and ANTARES neutrino telescopes, and takes a look at the future.

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