



Photo: ESO/B. Tafreshi

Cold Cosmos

At 5,100 meters above sea level, the air is thin and dry as a bone – properties that astronomers appreciate immensely. Up there, the dense aerial ocean of the Earth’s atmosphere and its otherwise substantial water content pose only a minor hindrance to observations, enabling researchers to get much closer to the vast wilderness of starry wasteland. That’s why they built an antenna on the Chajnantor plateau in the Chilean Andes: the *Atacama Pathfinder Experiment*, or APEX for short. The 12-meter dish detects millimeter and submillimeter radiation at the boundary between infrared light and radio waves.

Astronomers and technicians are currently upgrading the telescope. The centerpiece of this high-tech machine will be a camera with around 25,000 pixels, aimed at facilitating surveys of the heavens with unrivalled resolution. Of course 25,000 pixels isn’t much compared with, say, a smartphone camera, but the detectors have to operate at a temperature of minus 272.85 degrees Celsius, or just above absolute zero. The field of view of the camera is half the apparent size of the full moon.

Speaking of the moon: APEX’s application range extends far beyond our solar system. The telescope explores primarily cooler regions, especially molecular clouds in interstellar space. In these cosmic nurseries, new stars are born out of gas and dust; these stellar embryos are mostly invisible in optical light, but APEX is well suited to studying the physical and chemical properties of these clouds. Researchers also have their sights set on the most distant and therefore youngest galaxies, as the expansion of space has stretched their light and shifted it to the submillimeter or millimeter range of the spectrum.

The APEX partners are the Max Planck Institute for Radio Astronomy (MPIfR), the Swedish Onsala Space Observatory (OSO) and the European Southern Observatory (ESO), which operates the telescope on behalf of the consortium. The members recently agreed to extend the partnership until the end of 2022, so the dish on the Chilean high plateau will continue delivering deep insights into the cold cosmos in the coming years.