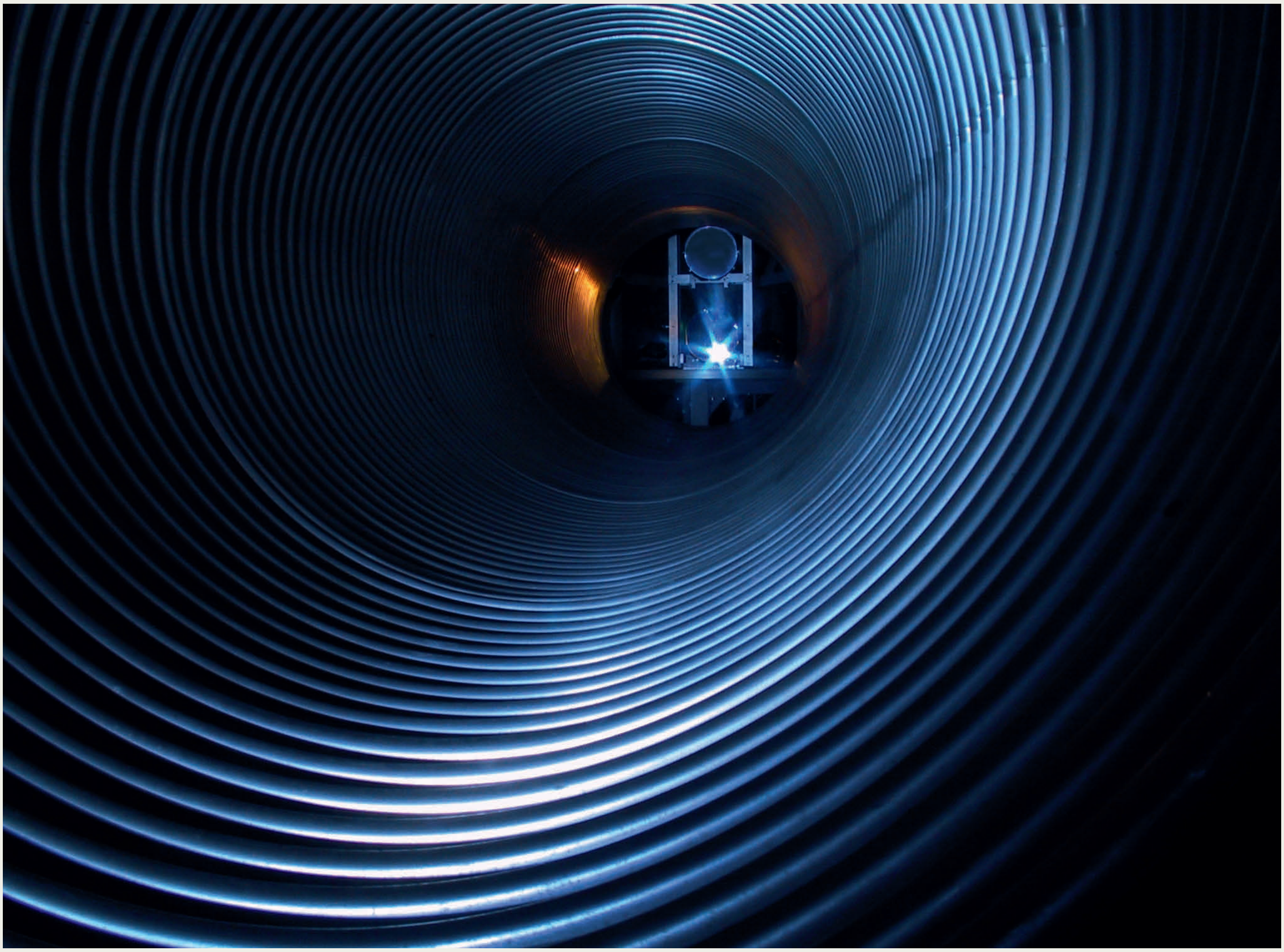

Photo: MPI for Gravitational Physics (AEI) – Harald Lück

Left out in the cold ...

... is not at all where the researchers from the Max Planck Institute for Gravitational Physics want to be. The issue at hand is nothing less than the base of one of the pillars of our modern world view, the theory of general relativity. In 1915, Albert Einstein formulated, among other things, the theory that the accelerated movement of masses causes disturbances that move through space at the speed of light. He called these disturbances gravitational waves. The Earth, for instance, creates a bulge in space-time on its annual orbit around the Sun, emitting gravitational waves in the process. Given the enormous number of planets and binary stars, space must be utterly teeming with these waves. In most cases, however, the cosmic ripples are too weak to be detected with terrestrial detectors. Fortunately, there are far stronger tremors in the universe: the dance or collision of neutron stars with black holes, or the explosion of a massive sun into a supernova.

Such violent events are what scientists around the world are waiting for – for example out in a field in Ruthe, near Hanover. This is where GEO600 stretches out its two 600-meter-long arms. The evacuated stainless steel tubes measure 60 centimeters in diameter and are corrugated to increase their stability. They house the second-longest laser beam interferometer in Europe. The measuring principle is based on the fact that gravitational waves alternately compress and stretch space. If they speed through GEO600, they will also change the paths of the laser beam that runs through the two perpendicularly arranged tubes. This tiny length difference on the order of 10^{-19} meters causes the light waves in the detector to fall out of step. A signal appears. Alarm! To date, however, there have been only test alarms. The researchers are working on continuously increasing the system's sensitivity. When the cosmos quakes again, they want to finally capture the gravitational waves and thus open up a new window into space.