

The world's most advanced mirrors

The world's largest primary mirror is 39m wide, the world's lightest mirror consists of only a single layer of 200 atoms... are the most advanced mirrors in the world.

Mirror of the world's largest optical telescope

The world's largest optical telescope, the Extremely Large Telescope (ELT), is being built on a mountain high in the arid Atacama Desert in Chile by the European Southern Observatory (ESO). By 2028, the ELT is expected to begin collecting images and help expand humanity's understanding of the universe.

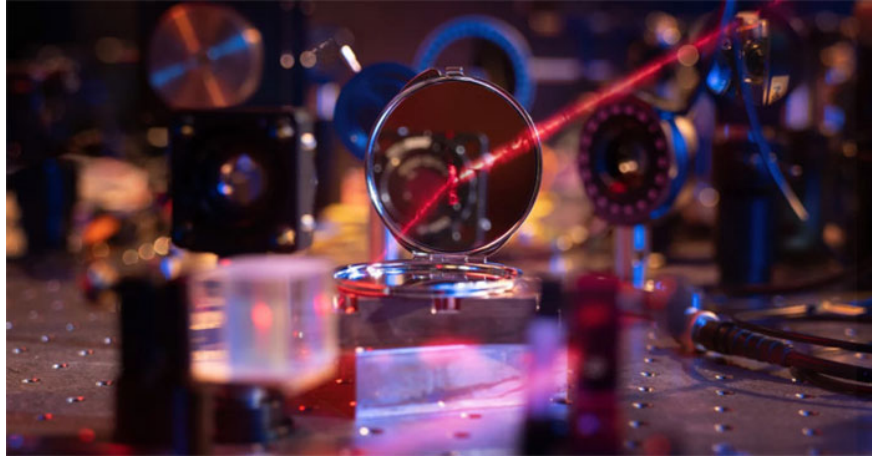
The ELT has five giant mirrors, M1, M2, M3, M4, and M5, which collect and guide light to the telescope's measuring instruments. The primary mirror, M1, is the largest mirror ever built for an optical telescope, measuring 39 meters in diameter and made up of 798 hexagonal mirrors, aligned to act as a perfect monolithic mirror. M1 can collect 100 million times more light than the human eye, maintaining its position and shape with 10,000 times the precision of a human hair.

The M2 convex mirror is 4.25m in diameter. The M4 is capable of changing shape 1,000 times per second to adjust for atmospheric turbulence and telescope vibrations - factors that can distort images - and is the mirror with the largest deformable surface in history.

The world's lightest quantum mirror

In 2020, scientists at the Max Planck Institute for Quantum Optics successfully developed a quantum mirror consisting of 200 aligned atoms that work together to reflect light, creating a mirror so small it is invisible to the naked eye.

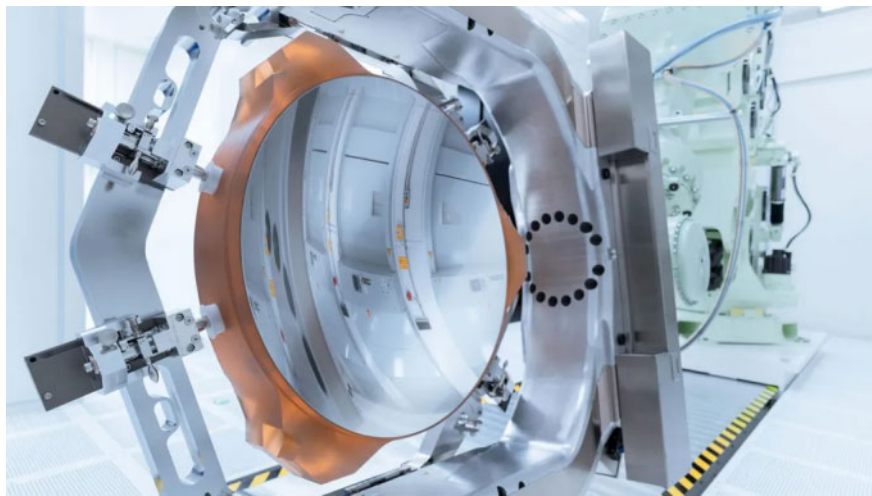
In 2023, they successfully placed a microscopically controlled atom at the center of a mirror, creating a "quantum switch" that controls whether the atom is transparent or reflective, opening up potential applications in a variety of quantum technologies, such as hack-proof quantum networks for storing and transmitting information.



Super flat mirror

In Oberkochen, Germany, the optics company Zeiss is making ultra-flat mirrors that are becoming a key component in computer chip printers called extreme ultraviolet (EUV) lithography machines.

Zeiss' EUV mirrors can reflect light at very small wavelengths, allowing images to be seen at extremely small scales, allowing more transistors to be printed on the same area of ??silicon wafer.



Dr. Frank Rohmund, president of Zeiss's semiconductor optics division, uses a topographical analogy to explain how flat these mirrors are. If a household mirror were enlarged to the size of Germany, its highest point would be 5 meters, while on the James Webb Space Telescope's mirror it would be 2 centimeters, and on an EUV mirror it would be just 0.1 millimeters.

The ultra-smooth mirror surface combined with mirror position control systems provides extremely high precision.

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