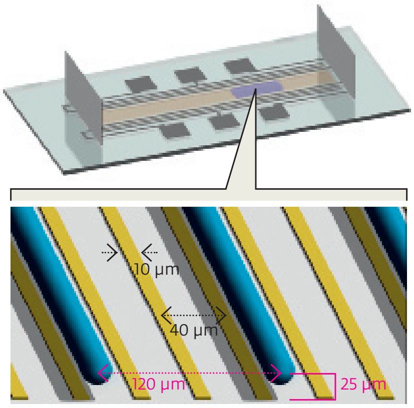
A Powder to Prevent Energy Waste

Max Planck chemists use a simple method to convert methane to methanol, which might make it possible to access previously unusable natural gas

It might no longer be necessary to burn off natural gas. Scientists at the Max Planck Institute of Colloids and Interfaces have developed a catalyst that simply and efficiently converts methane, the main constituent of natural gas, into methanol. The catalyst is a powder consisting of a nitrogenous material, a covalent triazine-based framework (CTF), into which platinum atoms have been inserted. CTF is very porous and thus has a large surface area, giving the methane ample room to react. This is what makes the catalyst so efficient, and because it is a solid, it is also easy to handle. It could also be worthwhile to use it to convert methane to methanol where other chemical processes or even a pipeline are not economical. It might then no longer be necessary to burn off more gas during oil extraction worldwide than is consumed by Germany each year. The process could also be helpful in tapping unprofitable sources of natural gas. It is currently estimated that natural gas resources will last another 130 years; however, the reserves where extraction is economical will flow for no longer than the next 60 years or so.
(Angewandte Chemie Int. Ed., in press)

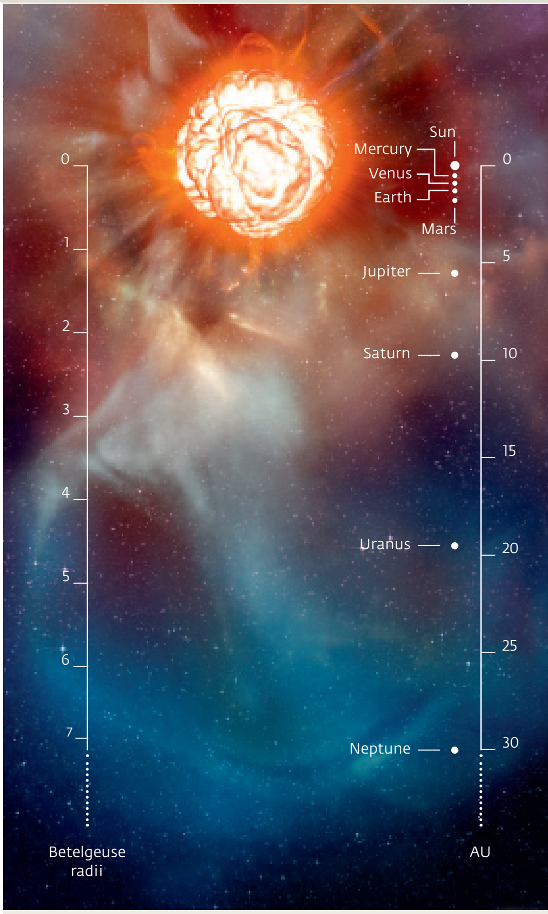
Molecules in a Microtrap

The way Sam Meek and his colleagues manipulate molecules on a chip is reminiscent of the skills of a soccer player: in the same way as he intercepts a pass with a deft movement of his leg, holds the ball still and then shoots it into the back of the net, these researchers at the Fritz Haber Institute of the Max Planck Society use electric fields to slow down carbon monoxide molecules and then speed them up again to be picked up by a detector. All of this happens over a distance of just five centimeters. What is more, the molecules move approximately ten times faster than a ball with a powerful boot behind it. Using 1,240 gold electrodes, the physicists control how the electrical fields, which catch the molecules as they fly past, move the molecules over the chip. Their clever trick makes it easier to carry out experiments with gas molecules. Such experiments could bring new knowledge about chemical reactions in industry or in the atmosphere. Previously, this required very large and expensive pieces of equipment. (SCIENCE, June 26, 2009)



Sam Meek constructed the molecule trap on a chip (top). It consists of 1,240 gold electrodes, shown on the diagram (bottom) as yellow strips. Using six different voltages, Meek and his colleagues created cylindrical potential traps (blue) in which they catch molecules.

Graphic: Fritz Haber Institute of the MPS (bottom), photo: ESO/L. Calcada (top)



Betelgeuse is a swirling giant. This artist's impression shows its enormous size in relation to the inner solar system.

A Giant in Turmoil

It's a form of astronomical end-of-life care: an international team working with researchers from the Max Planck Institute for Radio Astronomy observed a dying giant star in better resolution than ever before. The astronomers used the Very Large Telescope Interferometer (VLTI) on Cerro Paranal in Chile to observe Betelgeuse, which is the bright orange star that sparkles at Orion's left shoulder. They found that the atmosphere of the star creates gas bubbles that move up and down at speeds of around 40,000 kilometers per hour. The bubbles explosively eject material and become as large in diameter as the orbit of Mars around the Sun. This makes the bubbles almost as large as Betelgeuse itself – which, if it occupied the same place as the Sun, would swallow up Mercury, Venus, Earth, Mars and very nearly Jupiter, too.
(Astronomy & Astrophysics 2009)