

《Attachment》

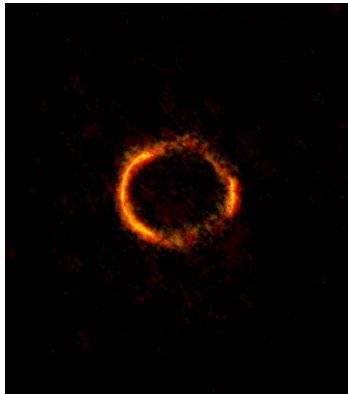


Image 1.

ALMA image of the gravitational lens system SDP.81. The bright orange sections of the ring (ALMA's highest resolution observation ever) reveals the glowing dust in this distant galaxy. The fainter lower-resolution portions of the ring trace the millimeter wavelength light emitted by carbon monoxide. Forming an Einstein ring is a rare phenomenon. Credit: ALMA (NRAO/ESO/NAOJ); B. Saxton NRAO/AUI/NSF

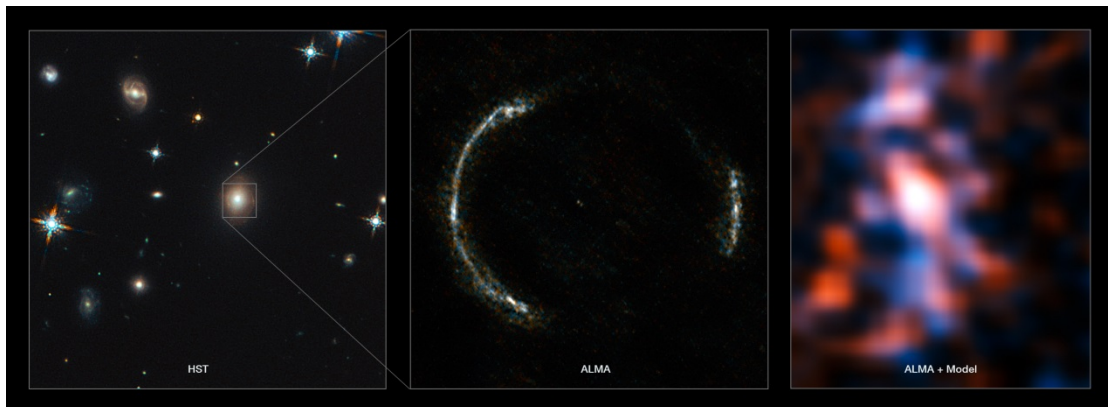


Image 2.

The left panel shows the foreground lensing galaxy (observed with Hubble), and the gravitational lens system SDP.81, which forms an almost perfect Einstein Ring but is hardly visible. The middle image shows the sharp ALMA image of the Einstein Ring. The foreground lensing galaxy is invisible to ALMA, as it does not emit strong submillimeter-wavelength light. The resulting reconstructed image of the distant galaxy (right) using sophisticated models of the magnifying gravitational lens reveals fine structures within the ring that have never been seen before: several giant clouds of dust and cold molecular gas, which are the birthplaces of stars and planets. Credit: ALMA (NRAO/ESO/NAOJ)/Y. Tamura (The University of Tokyo)/Mark Swinbank (Durham University).

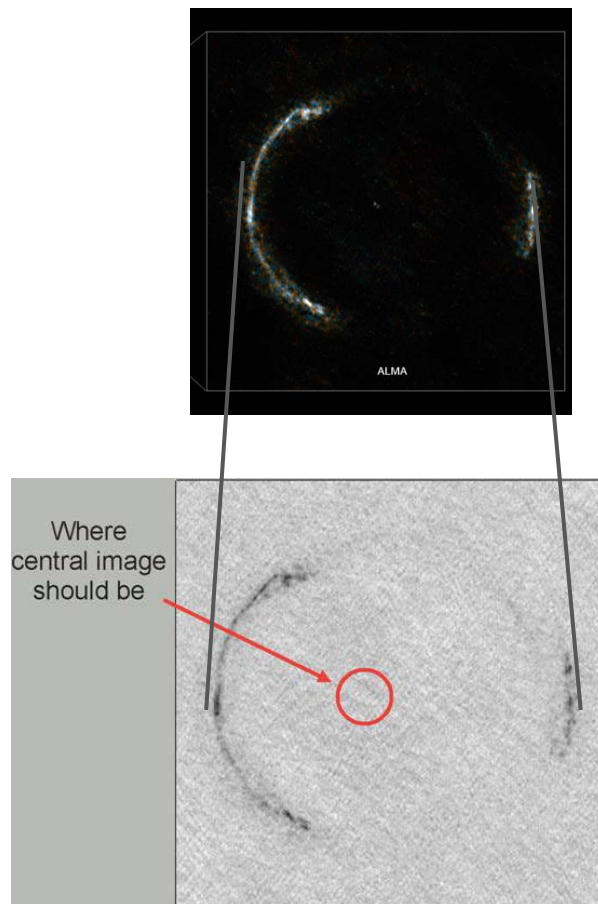


Image 3.

ASIAA astronomers have determined that the foreground galaxy in the SDP. 81 system, whose mass is lensing the background source into the Einstein Ring, contains a supermassive black hole that has more than 300 million times the mass of the Sun. Credit: ALMA (NRAO/ESO/NAOJ)/ Kenneth Wong (ASIAA).