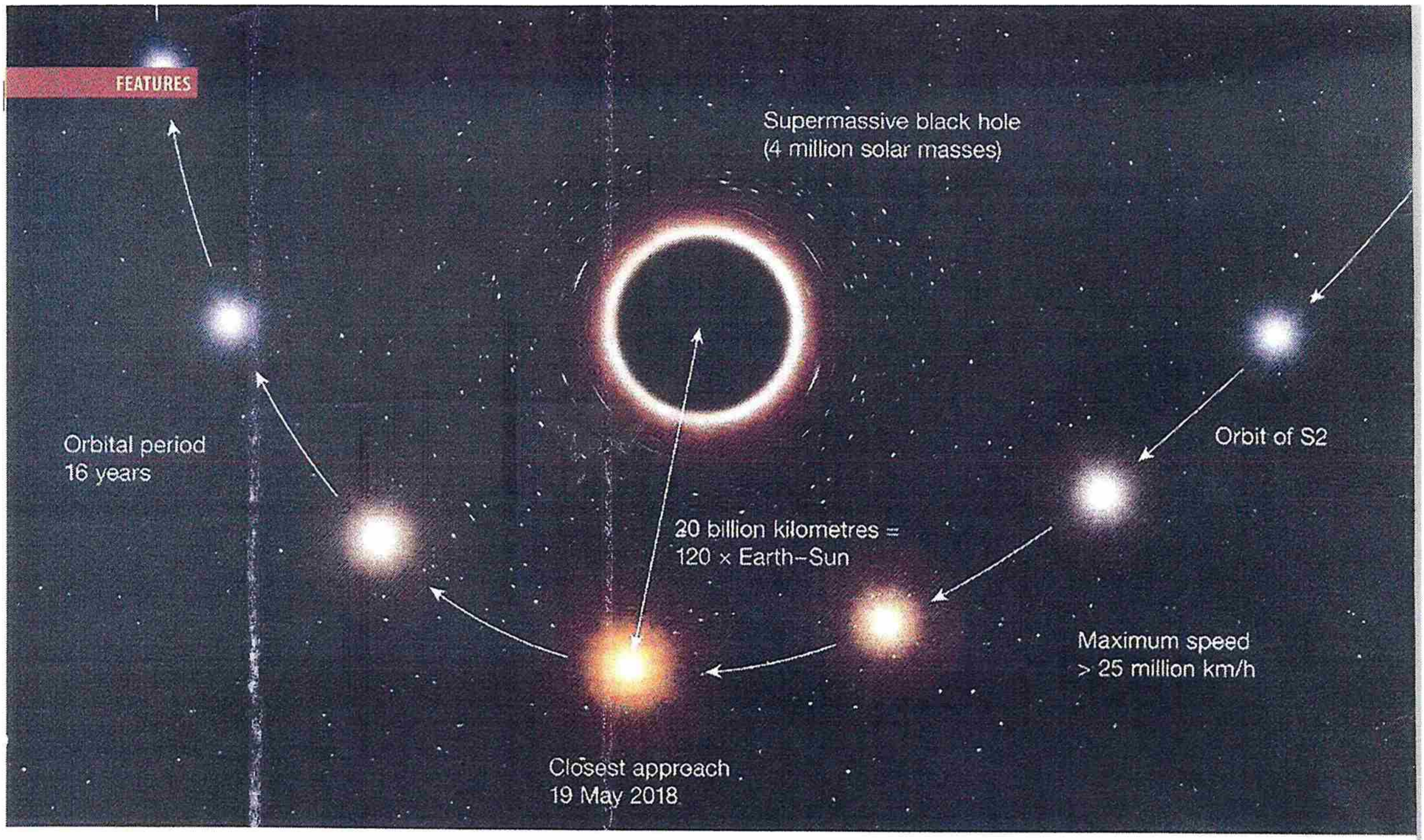
DESCRIVI LA PREPARAZIONE DI UNA NOTTE DI OSSERVAZIONE AL TELESCOPIO VST

ELEMENTI BASE PER LA PREPARAZIONE DI UN'ESPERIENZA DI INTERFEROMETRIA SU BANCO OTTICO IN LABORATORIO

DESCRIVI LA PREPARAZIONE DI UNA NOTTE DI OSSERVAZIONE AL TELESCOPIO 1.22 DI ASIAGO

ELEMENTI BASE PER LA PREPARAZIONE DI UN'ESPERIENZA DI DIFRAZIONE SU BANCO OTTICO IN LABORATORIO



NEW HORIZONS IN BLACK HOLE ASTROPHYSICS

Roger Blandford – KIPAC, Stanford University – https://doi.org/10.1051/epn/2021101

Black holes, a seemingly inevitable consequence of Einstein's general theory of relativity and stellar and galactic evolution are being observed in many new ways with masses ranging from roughly three to ten billion solar masses. Their masses and spins determine how they power the most luminous objects in the universe and impact their environments.

History

In 1916, just a few weeks after Albert Einstein published his general theory of relativity, Karl Schwarzschild, found a spherically symmetric solution to the field equations. Although this was not widely understood until the 1960s, this solution describes a non-spinning *black hole*, uniquely described by its mass [1]. It exhibits an event horizon, which can be thought of as a limiting, spherical surface in space from behind which light and material particles do not escape and, instead, as shown by Nobel Laureate Roger Penrose, proceeds towards a *singularity* where classical space and time come to an end [2]. The radius of the event horizon, measured by its circumference, is only 3 km for each solar mass in its total mass.

In parallel, astronomers realised that evolved, high mass stars were unlikely to escape ending their lives as black holes. They also discovered that the nuclei of galaxies could outshine the tens of billions of surrounding stars. One of the early interpretations of these sources, called quasars, was that they were due to gas accreting onto massive (millions to billions of solar masses) black holes and releasing gravitational energy as heat and radiation. This turned out to be correct.

Around this time, Roy Kerr generalised Schwarzschild's solution introducing a second parameter, the spin, and this suffices to describe essentially all astrophysical black holes. In addition, Penrose demonstrated that rotational energy could be extracted from a Kerr black hole to provide a competitive power source to accretion.