The **2019 Giuseppe and Vanna Cocconi Prize** for an outstanding contribution to Particle Astrophysics and Cosmology is awarded to the **WMAP and Planck Collaborations** for providing high-precision measurements of the cosmic microwave background temperature and polarization anisotropies, leading to detailed information on properties of the universe and tests of cosmological models and fundamental physics.

The cosmic microwave background (CMB), discovered in 1965, has been a pillar in our understanding of the universe since it was determined to be of cosmological origin. Emanating uniformly from all directions in the sky, the oldest light in the universe is the best-measured black-body in nature. Since then, three spacecrafts (COBE, WMAP and Planck) have made measurements of its temperature fluctuations in the power spectrum. The first detection of its anisotropies by the COBE satellite cemented the gravitational instability paradigm within a cold dark matter model.

WMAP was launched in 2001. Its team released the first detailed full-sky map of the CMB temperature and large-scale polarization in February 2003, showing that the fluctuations are predominantly adiabatic. This also provided multiple, simultaneous, tight constraints on cosmological parameters [1] such as the age of the universe, the curvature of space, the reionization age, and the energy budget of the universe in terms of baryons, dark matter and dark energy – a legacy that the Planck mission has continued and enriched.

Planck, launched in 2009, has taken more refined measurements, both in total intensity and polarization, in a different wavelength range, producing deep, high-resolution, all-sky maps in nine frequency bands from 30 to 857 GHz. Cosmic measurements were announced in 2013, based mainly on temperature maps of the whole sky acquired during the nominal mission duration of 14 months [2]. The first results from the full mission, including some polarization data, were presented in 2015. With 18 peaks in the temperature and polarization angular power spectra constrained well, Planck currently provides our strongest constraints on the parameters of the standard cosmological model. The Planck data, alone and in combination with other probes, provide stringent constraints on our models of the early Universe and the large-scale structure within which all astrophysical objects form and evolve, strengthening the inflationary paradigm.

WMAP was proposed to NASA in 1995 and led by an American team. Operations were completed in 2010. See [https://map.gsfc.nasa.gov](https://map.gsfc.nasa.gov)

Planck is an ESA mission and a worldwide collaboration. The mission closed in 2018 with a release of the full data set. See [https://www.cosmos.esa.int/web/planck](https://www.cosmos.esa.int/web/planck)