

Fowler Award 2021 – Dr James Owen

Full citation

Dr James Owen is awarded the Fowler Award for 2021, for his theory of atmospheric evaporation in small, close-orbiting exoplanets, and his prediction of the “radius valley” found by the Kepler mission team.

After gaining his PhD in 2011, Dr Owen developed an elegant analytic theory of how stellar radiation interacts with the atmospheres of small exoplanets, a few times the size of Earth, that revolve very close to their parent stars.

He predicted that extreme heating due to stellar irradiation causes these planets’ atmospheres to lose mass over time. Dr Owen found that runaway evaporation strips the entire atmospheres of less massive planets orbiting closer to the star. In more massive, distant planets, the evaporation slows over time, allowing them to retain substantial atmospheres. Thus, his work predicted a bimodal distribution of planet sizes: small iron-silicate planets whose atmospheres have been stripped away, and larger planets with volatile-rich envelopes, separated by a sparsely-populated “valley” in planet size.

In 2017, the California Kepler Survey Team published a rigorous analysis of the size distribution of small close-in planets discovered with the Kepler Space Telescope. A gap was found precisely where Dr Owen's work had predicted it to be. The discovery of Dr Owen's “evaporation valley” is considered one of the most important and long-lasting results of the Kepler mission.

For these reasons Dr James Owen is awarded the Fowler Award for 2021.

Short citation

Dr James Owen is awarded the Fowler Award for 2021, for his theory of atmospheric evaporation in small, close-orbiting exoplanets, and his prediction of the “radius valley” found by the Kepler mission team.