# Predicting the optical performance of the Ariel Telescope using PAOS

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The Ariel Space Mission is the M4 mission in ESA's Cosmic Vision program and will observe a large and diverse sample of exoplanetary atmospheres in the visible to the near-infrared range of the electromagnetic spectrum. Assessing the impact of diffraction, aberrations, and related systematics on the Ariel optical performance before having a system-level measurement is paramount to ensuring that the optical quality, complexity, costs, and risks are not too high.

Several codes offer Physical Optics Propagation (POP) calculations, although generally, they are not easily customizable, e.g., for Monte Carlo simulations, are not free access and publicly available, or have technical limitations such as not providing support for refractive elements.

PAOS, the Physical Ariel Optics Simulator, is an end-to-end Physical Optics Propagation (POP) model of the Ariel telescope and subsystems. PAOS implements Fresnel diffraction in the near and far fields to simulate the propagation of the complex electromagnetic wavefront through the Ariel optical chain and deliver the realistic PSFs vs. lambda at the intermediate and focal planes.

PAOS is written with a full Python 3 stack and comes with an installer, documented examples, and an exhaustive guide. PAOS is meant to be easy to use, generic and versatile for POP simulations of optical systems other than Ariel's, thanks to its generic input system and built-in GUI providing a seamless user interface and simulations.