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End-to-end coronagraphic simulations of SHARK-NIR, the II-generation high-contrast imager for the Large Binocular Telescope

We present a simulator conceived for the conceptual study of an AO-fed high-contrast coronagraphic imager. The simulator implements physical optics: a complex disturbance (the electric field) is Fresnel-propagated through any user-defined optical train, in an end-to-end fashion. The effect of atmospheric residual aberrations and their evolution with time can be reproduced by introducing in input a temporal sequence of phase screens: synthetic images are then generated by co-adding instantaneous PSFs. This allows studying with high accuracy the impact of AO correction on image quality for different integration times and observing conditions. The simulator has been developed in the framework of the design of SHARK-NIR, a second-generation high contrast imager selected for the Large Binocular Telescope. We also report some of the results of the trade-off study that led to the selection of the currently foreseen coronagraphs.

Author: VASSALLO, Daniele

Presenter: VASSALLO, Daniele