PARTIALLY FILLED APERTURE INTERFEROMETRIC TELESCOPES: ACHIEVING LARGE APERTURE AND CORONAGRAPHIC PERFORMANCE. Gil Moretto\(^1\) on behalf of the PLANETS FOUNDATION\(^2\), \(^1\) Centre de Recherche Astrophysique de Lyon, Centre National de la Recherche Scientifique (CNRS) and Université de Lyon, 69561, FRANCE, \(^2\) PLANETS FOUNDATION (https://www.planets.life) Institute for Astronomy, University of Hawaii, 34 Ohia Ku, Pukalani, Maui, HI, USA 96790.

**Introduction:** The exponential growth in exoplanet studies and science cases requiring high contrast observations is a powerful reason for developing very large optical systems optimized for narrow-field science.

Concepts which cross the boundary between fixed aperture telescopes and interferometers, combined with technologies that decrease the system moving mass, can violate the cost and mass scaling laws that make conventional large-aperture telescopes relatively expensive. Here we describe concepts of large, filled-aperture and its variants partially filled aperture interferometric optical/IR telescope systems which break this scaling relation.

Future telescopes larger than 40m diameter may be built as nearly close-packed co-moving phased-arrays. To decrease the total system mass the subaperture mirror elements will use force-servoed active mirror control with 1000’s of closed-loop actuators. Small adaptive secondary mirrors and image speckle information from bright on-axis sources will provide fast and slow-adaptive wavefront control at the common Gregorian focus of the optical system. The most natural optical configuration will use off-axis parabolic segments with mirrors that could weigh as little as 60kg/m\(^2\). Next figure shows the gains on the resolution and contrast making use of the 60x8m rectangular configuration (The Colossus) in comparison of a single off-axis 8m aperture. Those are the preliminaries numerical simulations and a more accurate and with more AO scenarios is under realization to obtain more details information on our model and strategy.

The PLANETS FOUNDATION group has prototyped these new technologies that will enable lightweight mirror controls, and has developed an optical design for a 75m filled-aperture (60x8m) and 100m partially filled-aperture telescopes which have sufficient aperture and scattered light suppression to allow detection of exoplanet biomarkers and perhaps even civilization technomarkers within 60 light years of the Sun.