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LAPCAT: A LARGE, OFF-AXIS OPTICAL/INFRARED TELESCOPE FOR DIRECT IMAGING OF PLANETS AROUND OTHER STARS

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We present a proposal for an 8.4 metre off-axis optical/IR telescope to be located at Dome C, Antarctica. LAPCAT, the Large Antarctic Plateau Clear-Aperture Telescope, will use a mirror identical to the offset segment recently cast for the Giant Magellan Telescope (GMT) as a completely unobscured f/2.1 primary. LAPCAT will allow for diffraction-limited imaging with only a single reflecting surface at ~ 220K, and thus the lowest possible thermal background obtainable on earth. The exceptionally low atmospheric turbulence above Dome C enables very high contrast imaging in the thermal infrared, and diffraction limited imaging extending to optical wavelengths. As an example, a deep 5 micron exoplanet imaging survey to complement current radial velocity methods could take advantage of both the low background and pupil remapping methods for apodization enabled by the clear aperture. Many new, young, giant planets would be detected. By providing a test bed for many of the GMT technologies in an Antarctic environment, LAPCAT also paves the way for the eventual construction of a second GMT at Dome C. Such a telescope would have unparalleled capabilities compared both to other Extremely Large Telescopes (ELTs) in temperate sites and to the next-generation space telescope, the JWST.