

# Fresnel imager testbeds: setting up, evolution, and first images

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Received: 12 July 2010 / Accepted: 5 January 2011 / Published online: 12 May 2011  
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**Abstract** The Fresnel Diffractive Array Imager (FDAI) is a new optical concept proposed for large telescopes in space. To evaluate its performance on real sky objects, we have built a new testbed of FDAI, especially designed for on-sky operation. It is an evolution of the laboratory setup previously used to validate the concept on artificial sources. In order to observe celestial objects, this new two-module testbed was installed in July 2009 at *Observatoire de la Côte d’Azur* (Nice, France). The two modules of the testbed (the Fresnel array module and the receiver module), were secured at both ends of the 19 m long tube of an historical refractor, used as an optical bench on an equatorial mount. In this article, we focus on the evolution steps from a laboratory experiment to the first observation prototype, and on the targets chosen for performance assessment. We show the first on-sky results of a FDAI, although they do not reflect the nominal performances of the final testbed. These nominal performances have been attained only with the latest and most sophisticated prototype, and are presented in a separate article in this special issue.

**Keywords** Diffractive focussing · Formation flying · High angular resolution · High dynamic range · UV domain · Exoplanets

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