

# Low-contrast pre-coronagraph for extra contrast of dark-hole

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**Abstract.** We propose a low-contrast pre-coronagraph that can provide additional dark-hole contrast to a main coronagraph.

**Keywords.** instrumentation: adaptive optics, techniques: interferometric.

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## 1. Pre-coronagraph under dark-hole control

The low-contrast pre-coronagraph (LPC) is a new style of the unbalanced nulling interferometer (UNI) which was developed for precise wavefront control (Nishikawa *et al.* 2008). The LPC is used in the four-stage coronagraph system: the first deformable mirror (DM), the LPC, the second DM, and the main coronagraph, to obtain an additional contrast to the main coronagraph. Originally a wavefront sensor was used around the UNI (LPC) and we characterized it using a four-quadrant phase mask coronagraph (Kobayashi, *et al.* 2012). Recently we have found that the two deformable mirrors in the system can be controlled by the dark-hole algorithm with a final focal-plane detector if we use two steps. First, the control is made by the first DM with a normal mask at the pre-coronagraph and without a mask at the main coronagraph. Second, the control is made by both two DMs to produce the circular dark hole with a low-contrast mask exchanged at the pre-coronagraph and with a normal mask at the main coronagraph.

## References

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