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The ASTRI Mini-Array as a Stellar Intensity Interferometer

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The ASTRI Mini-Array is an International collaboration, led by the Italian National Institute for Astrophysics (INAF), that is constructing and operating an array of nine Imaging Atmospheric Cherenkov Telescopes to study gamma-ray sources at very high energy (TeV) and perform optical stellar intensity interferometry observations.

Angular resolutions below 100 microarcsec are achievable with stellar intensity interferometry (SII), using telescopes separated by hundreds to thousands of meters baselines. At this level of resolution it turns out to be possible to reveal details on the surface and of the environment surrounding bright stars on the sky. The ASTRI Mini-Array will provide a suitable infrastructure for performing these measurements thanks to the capabilities offered by its 9 telescopes, which provide 36 simultaneous baselines over distances between 100 m and 700 m.

After providing an overview of the scientific context and motivations, we present the advanced design for the ASTRI Stellar Intensity Interferometry Instrument (SI3), a fast single photon counting instrument that will be mounted on the ASTRI telescopes and dedicated to performing SII observations of bright stars. We will also show a few preliminary simulations that offer a glimpse of the extraordinary angular resolution achievable for investigating stellar astrophysics.

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