

DIRECT DETECTION OF EXOPLANETS USING TUNABLE KERNEL-NULLING

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In a nutshell 🥜

This thesis proposes an innovative approach, tunable Kernel-Nulling, for high-contrast imaging of exoplanets. Using integrated optics technology with electronically controlled phase shifters, the method asymmetrically modifies the nuller's response, allowing the discrimination of astrophysical signals from diffraction-induced speckles. The device's performance optimization involves machine learning techniques, initially in a controlled setting and later in realistic observing conditions. This approach promises to significantly enhance interferometric high-contrast imaging, providing a powerful solution for achieving deep and robust observations.

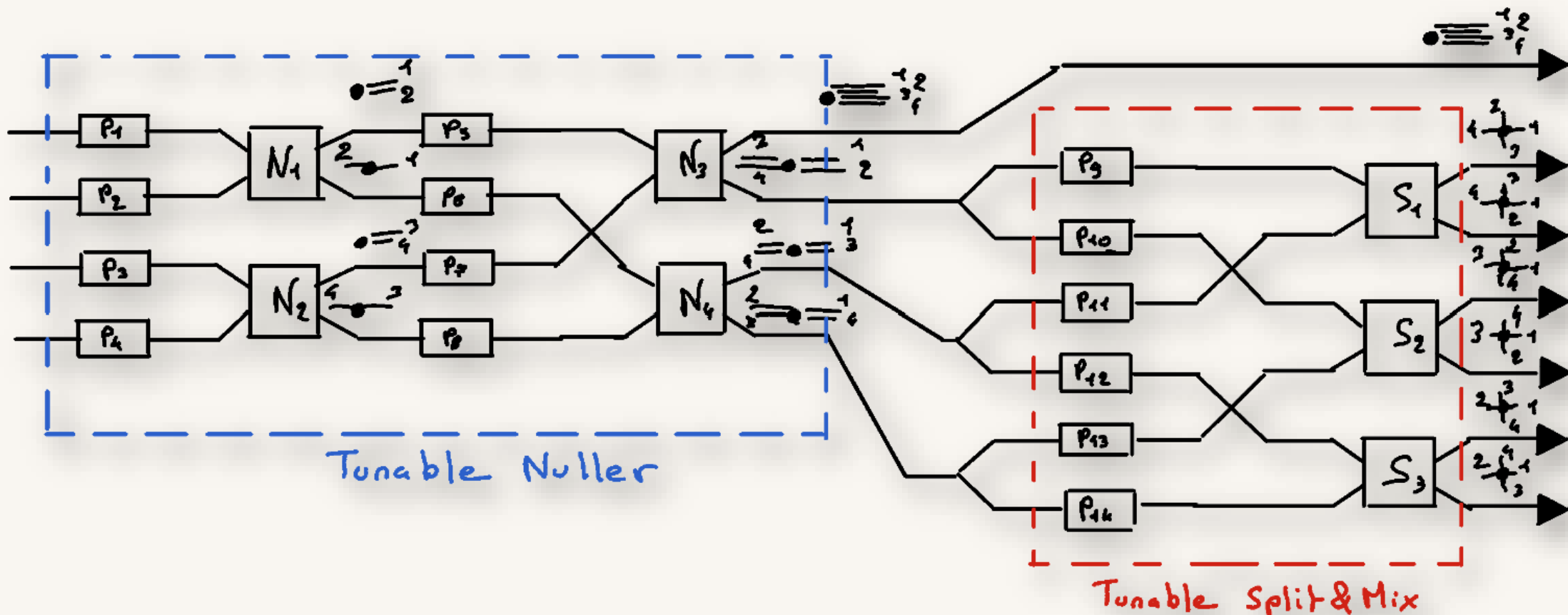


Figure 1: Scheme of our Kernel-Nulling architecture

Nulling interferometry 🌊

Blablabla

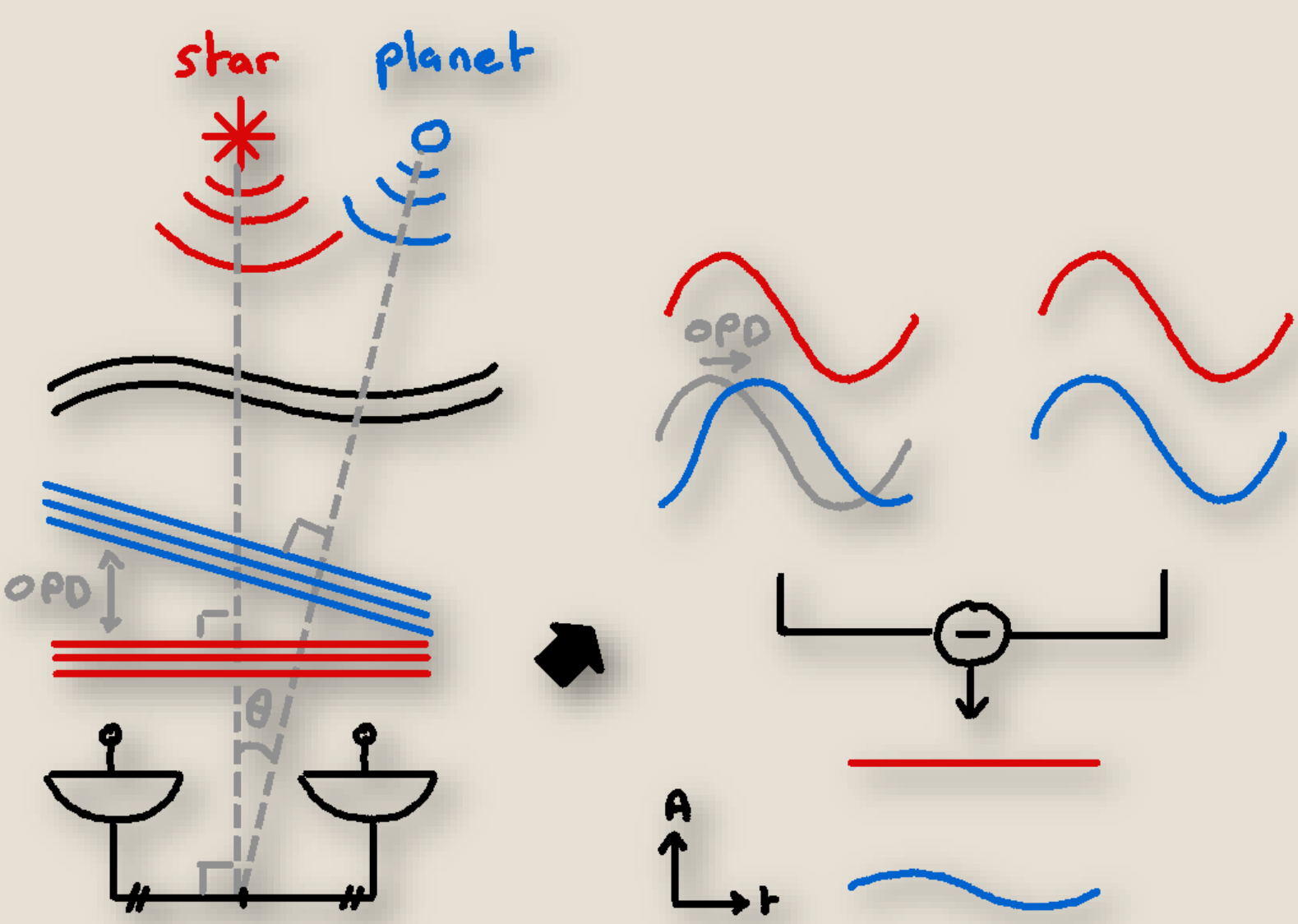
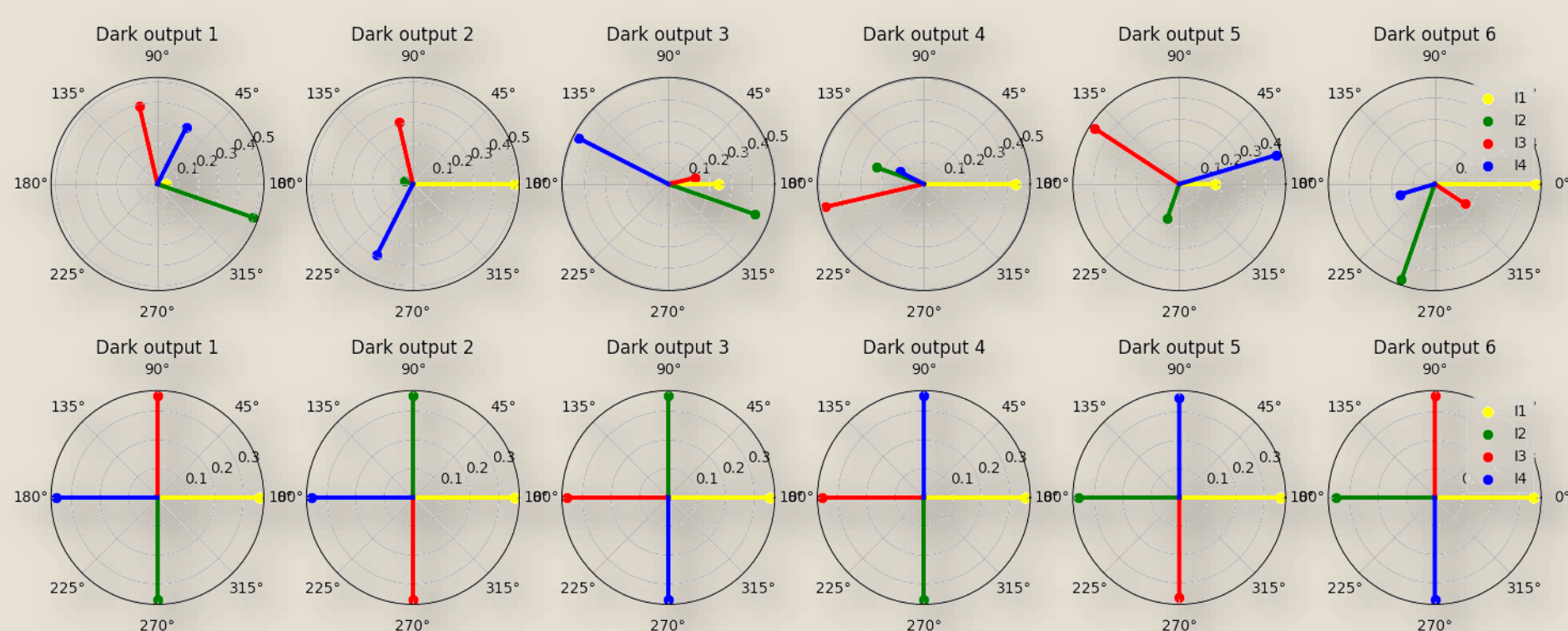


Figure 2: Concept of nulling interferometry

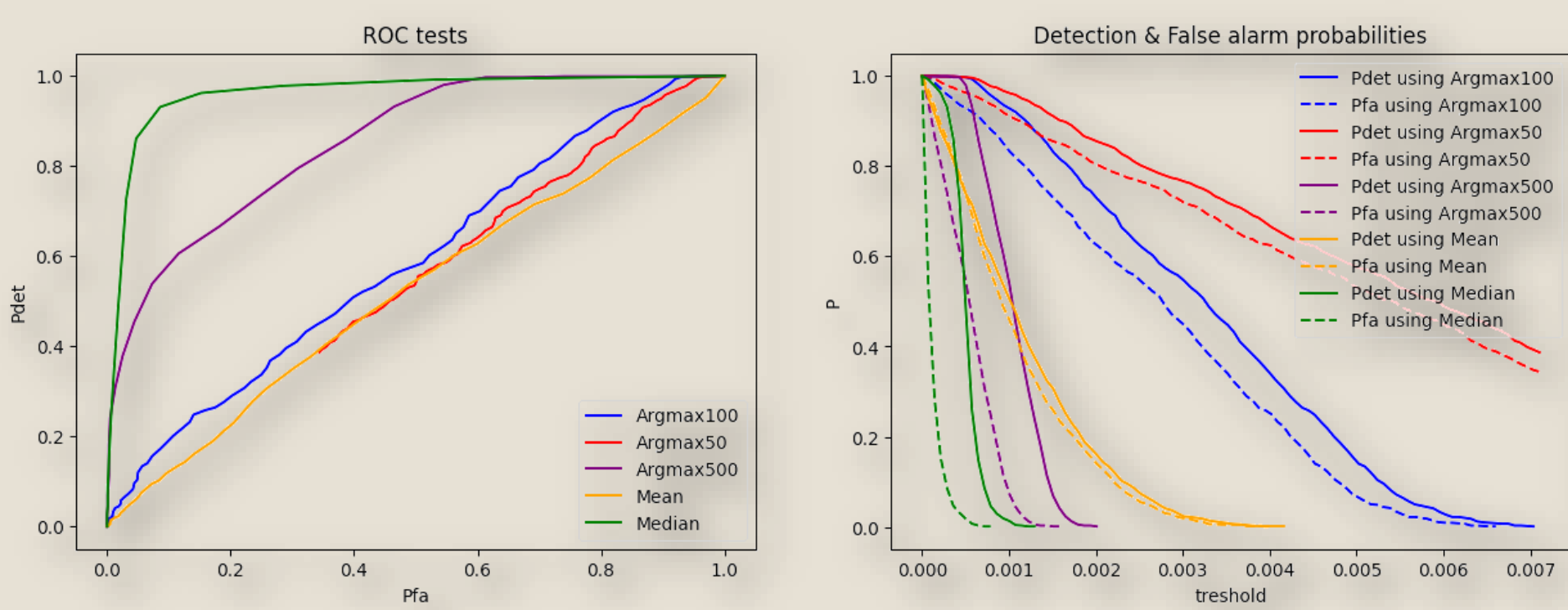
Calibration algorithm 📊

Blablabla



Statistical analysis 📊

Blablabla



Thermo-optic phase shifter 🌡️

Blablabla

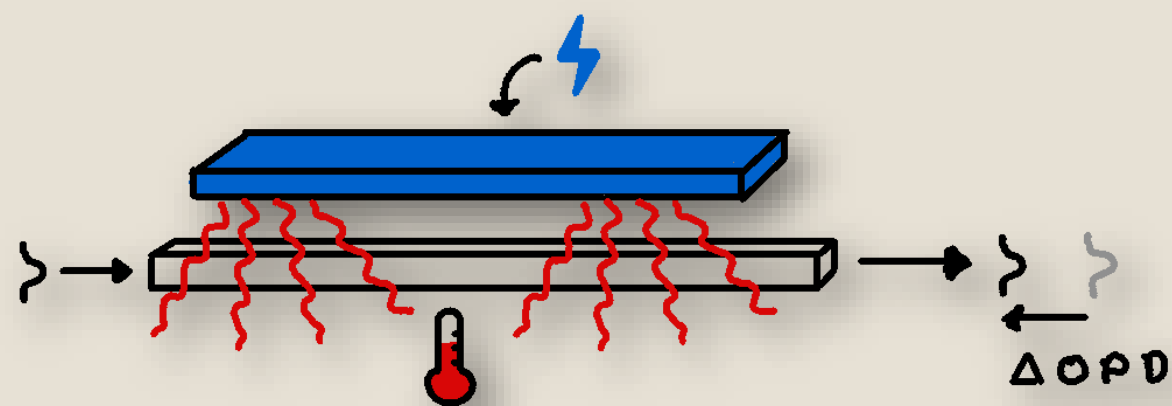
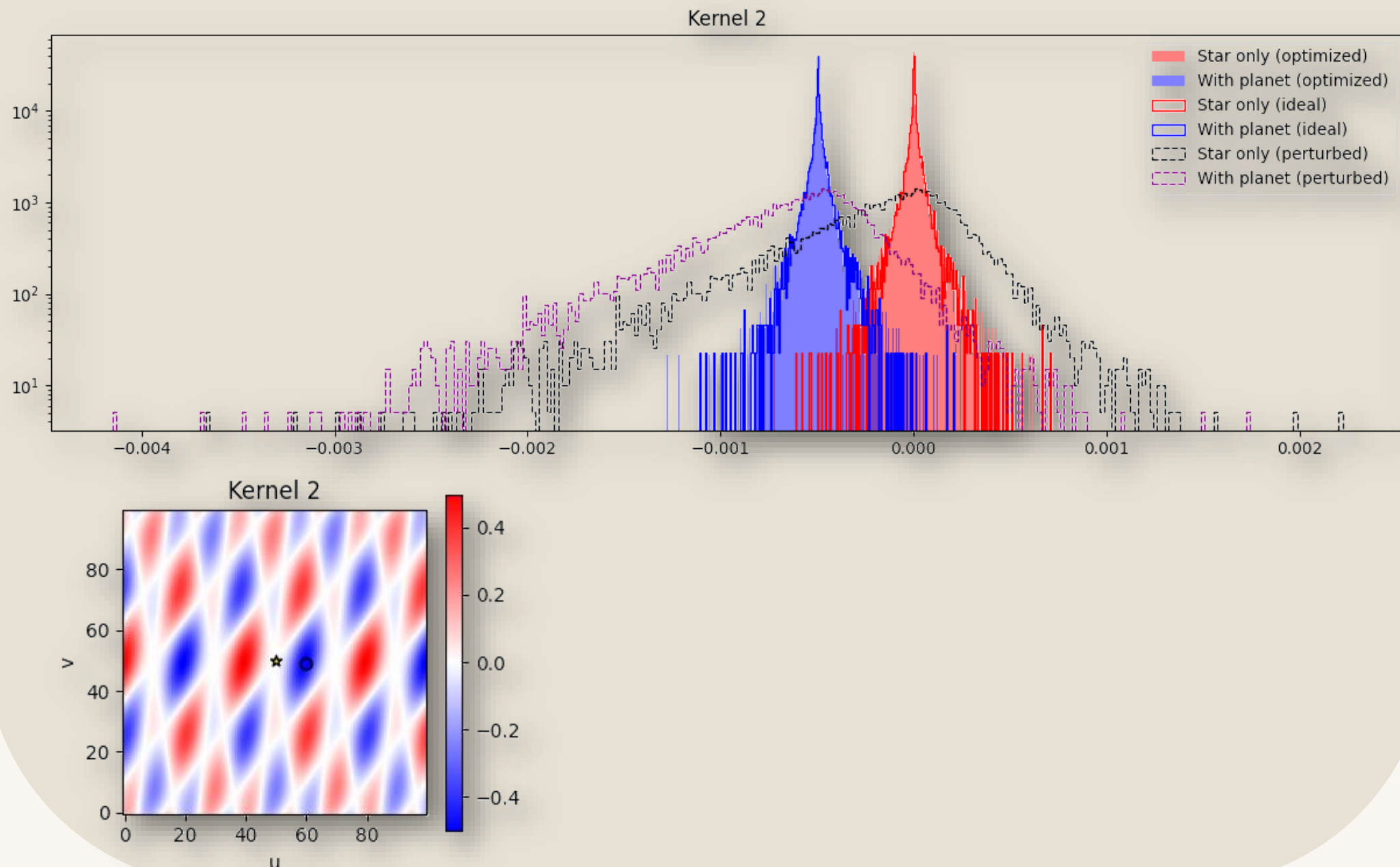


Figure 3: Scheme of thermo-optic phase shifter

Kernels 💎

Blablabla



Discussions & prospects 💬

Blablabla

References 📖

Blablabla

Acknowledgment 🙏

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