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Optimizing gravitational-wave sky maps for PTAs

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Gravitational-wave sky maps are a key tool for understanding the origin of the gravitational-wave background (GWB) signal in PTA data sets. Moreover, as they depict the gravitational-wave power sky distribution is, close-by supermassive-black-hole binaries are potentially revealed as hot-spots on these maps. A crucial factor for the identification of these hot-spots and the resulting level of anisotropy is the resolution of the PTA, and its proper reflection in the map calculation procedure.
In this talk, we present a novel scheme to calculate the Point-Spread-Function (PSF) of a PTA in terms of the sky map analysis. This scheme is used to illustrate the shortcomings of the currently employed setup of spherical-harmonics-based anisotropy analyses. Based on the findings, we propose a reworked anisotropy analysis setup. At hand of simulated data sets, we demonstrate the improvements it brings to the identification of anisotropies in the GWB.

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