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Sourcing axions in the magnetospheres of neutron stars

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Neutron stars can host strong electromagnetic fields deep in their magnetospheres capable of sourcing axions. Low mass axions are produced relativistically and can resonantly convert into radio photons as they escape the magnetosphere. For heavier axions an increasing fraction will instead end up populating a cloud of bound states around the parent neutron star. In this talk I will discuss the fundamental physics driving both axion production and conversion in these scenarios, followed by an end-to-end analysis pipeline that facilitates an accurate description of the prospective radio flux. This is finally compared with radio observations of nearby pulsars to derive some of the strongest constraints to date on the axion-photon coupling.

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