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Dust properties in the Crab nebula: constraints from infrared emission polarisation

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For its numerous effects on the evolution of a galaxy, dust has been studied in detail ever since its discovery. Visible in emission in the infrared regime, its spectral energy distribution is a powerful tracer of many properties, when fit by physical dust models. There remains however a property of dust grains that has not yet been poked at extensively, potentially retaining some crucial information: the polarisation of light from scattering off dust grains. In this talk, we will present our latest results using SOFIA/HAWC+ C and D polarisation measurements of the Crab supernova remnant (SNR). Using radio synchrotron measurements, we remove the contaminating contribution of synchrotron polarisation, and derive supernova dust-only polarisation fraction and angle. From these new observations, we constrain the fraction of carbon grains, dust composition, temperature and mass of silicate- and carbon-rich grains, in the Crab Nebula. Constraining the dust composition and grain size in SNRs is vital to estimate the net SN dust production rate and to gauge their importance in building up galactic dust budgets.

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