Disentangling Sub-GeV Dark Matter from the Diffuse Supernova Neutrino Background using Hyper-Kamiokande

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In honour of my collaborators in Melbourne U.

- The Diffuse Supernova Neutrino Background (DSNB) is a steady state neutrino flux from all past core-collapse supernovae in the Universe.
  - ➡ Isotropic, quasi-thermal signal, $\mathcal{O}(10\,\mathrm{MeV})$.
  - ➡ Traces star formation rate.
  - ➡ Not discovered yet.
- HyperK is expected to measure the DSNB and have sensitivity to thermal dark matter (DM) annihilating into neutrinos in the energy window for DSNB searches.
- Can neutrinos from DM annihilation contribute a background for DSNB searches?
  - ➡ We simulate the DSNB signal and backgrounds in HyperK.
- We find that the presence of DM could lead to incorrect inferences about the astrophysics behind the DSNB and potentially missing a sub-GeV DM signal.
- A simple on-off analysis can help in detecting the presence of DM in the DSNB dataset.