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Analysing the SEDs of protoplanetary disks with machine learning

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A common method to determine the physical properties of protoplanetary disks is to analyse their spectral energy distributions (SEDs). However, the results are well-known to be degenerate. Running a full Bayesian analysis that can address this problem is challenging due to the high computational cost of full radiative transfer models. In my talk, I will show how we successfully train Neural Networks on sets of MCFOST single and two-zone models to predict SEDs. These predictions have a computational cost that is a factor of ˜10ˆ5 lower than the cost of the modelling software. We use this method to fit the SEDs of 30 well-observed protoplanetary disks using Bayesian analysis. Therefore, we get the uncertainties for all model parameters and can examine degeneracies. Additionally, we can analyse the influence of all model parameter on the SED and estimate how much information different flux measurements give about disk properties like the dust mass of the disk.

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