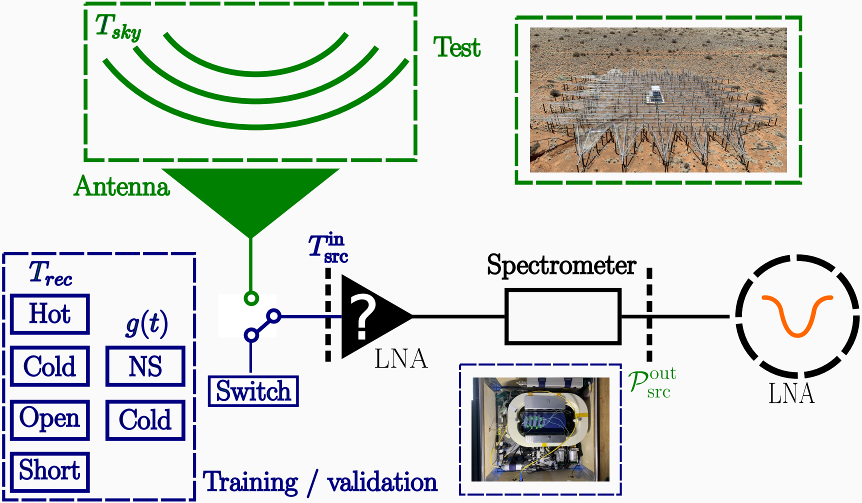
Machine learning for radiometer calibration in global 21cm cosmology



Co-authors: Harry Bevins, Will Handley, Eloy de Lera Acedo, Jiacong Zhu, Kaan Artuc, Daniel Molnar

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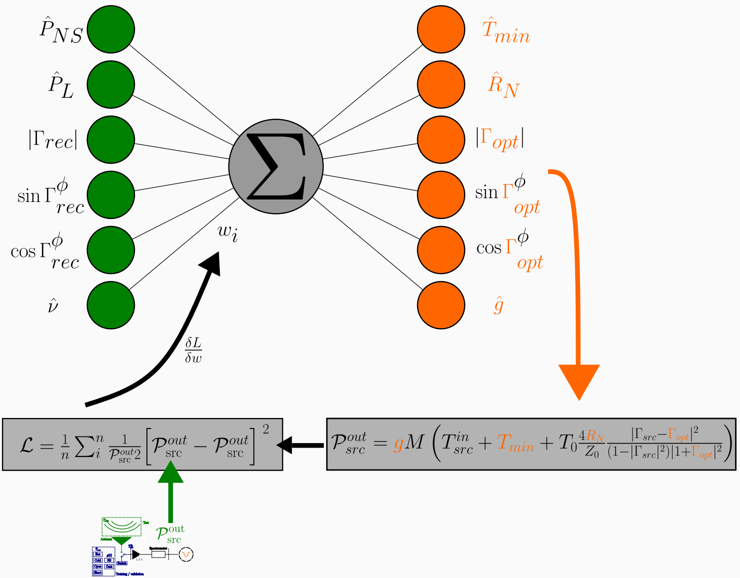

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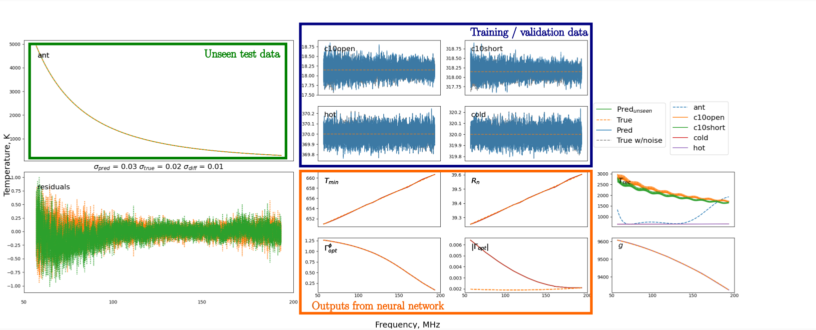

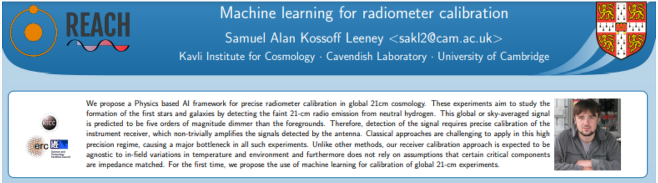

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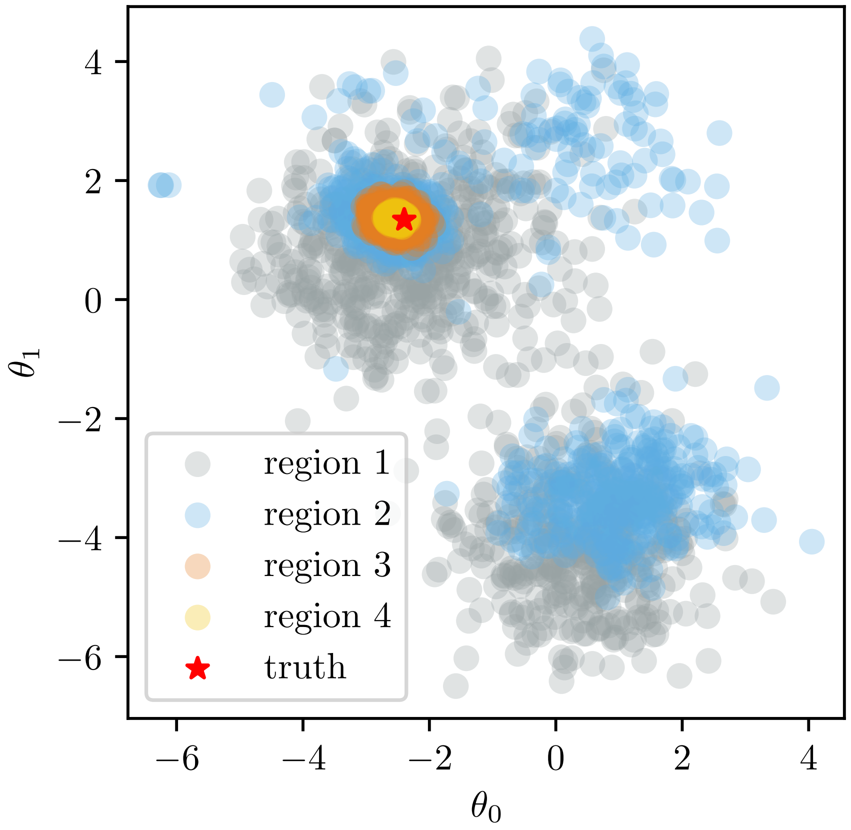
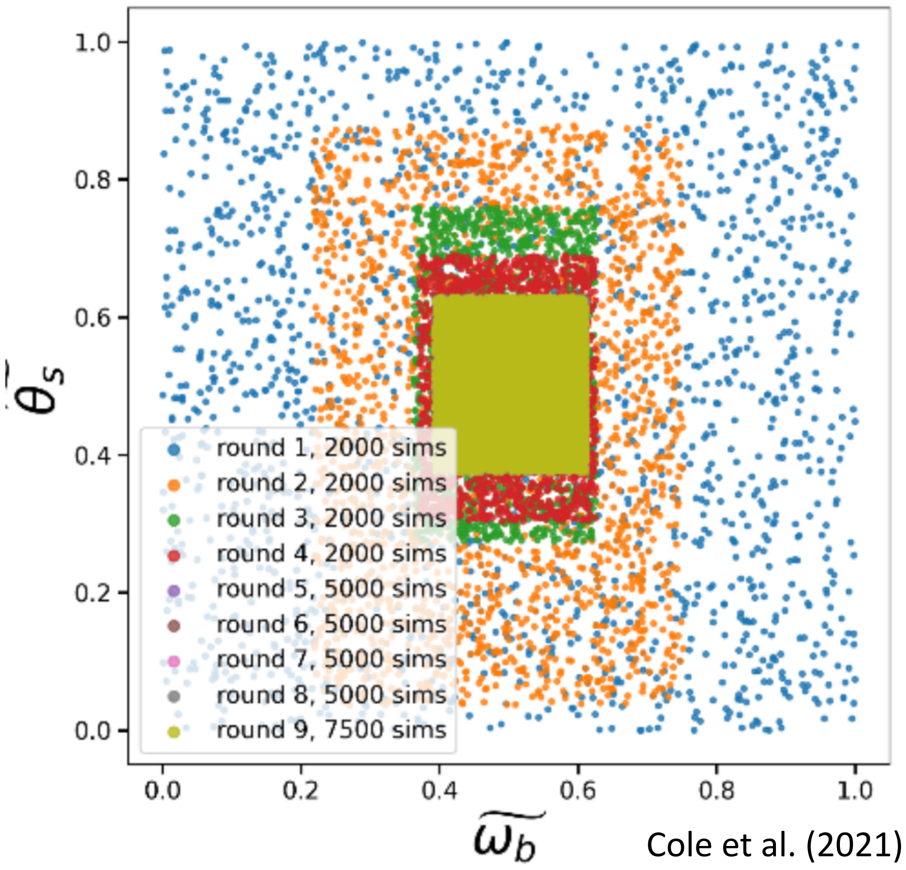
PolySwyft: Sequential simulation-based nested sampling

Nested sampling



SBI (with NRE)



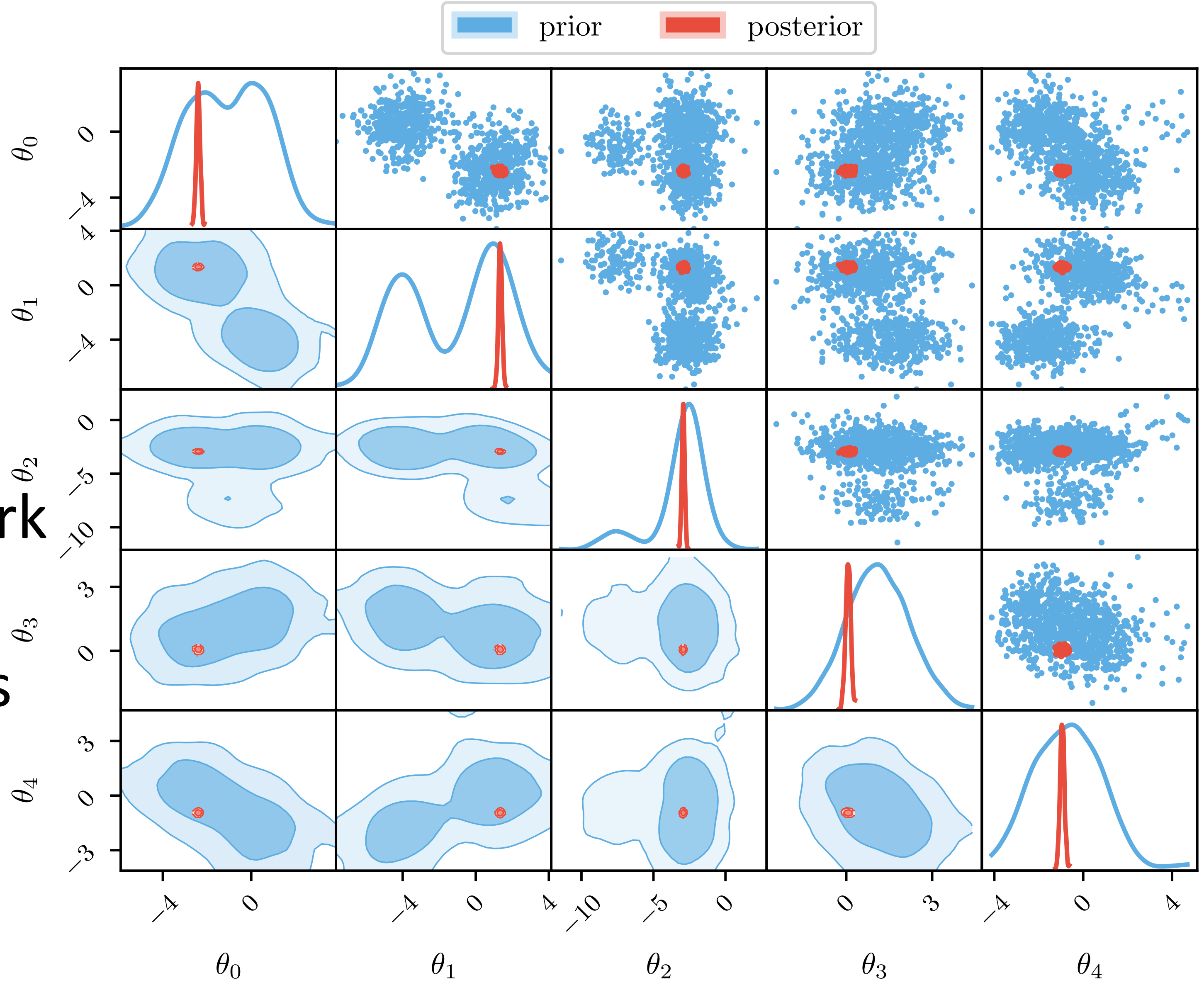
Cole et al. (2021)

PolySwyft

=

Merging NS and SBI into
a general Bayesian framework

Accurate posterior estimates
without a likelihood !



Bayesian Hierarchical Inference for **D**ark **M**atter Detection from Overheated Exoplanets

María Benito Castaño

EuCAIFCon 2024

UNIVERSITY OF TARTU
Tartu Observatory
NICPB
KBFI
Estonian Research Council
COSMIC WISPERS
CA21106

Dark **M**atter particle landscape

QCD axion

$10^{-6} - 10^{-4}$ eV

sub-GeV DM

1 MeV-10 GeV

WIMPs ♥

10 GeV-10 TeV

Primordial Black Holes

$10^{-17} - 50\,M_\odot$

10^{-21} eV

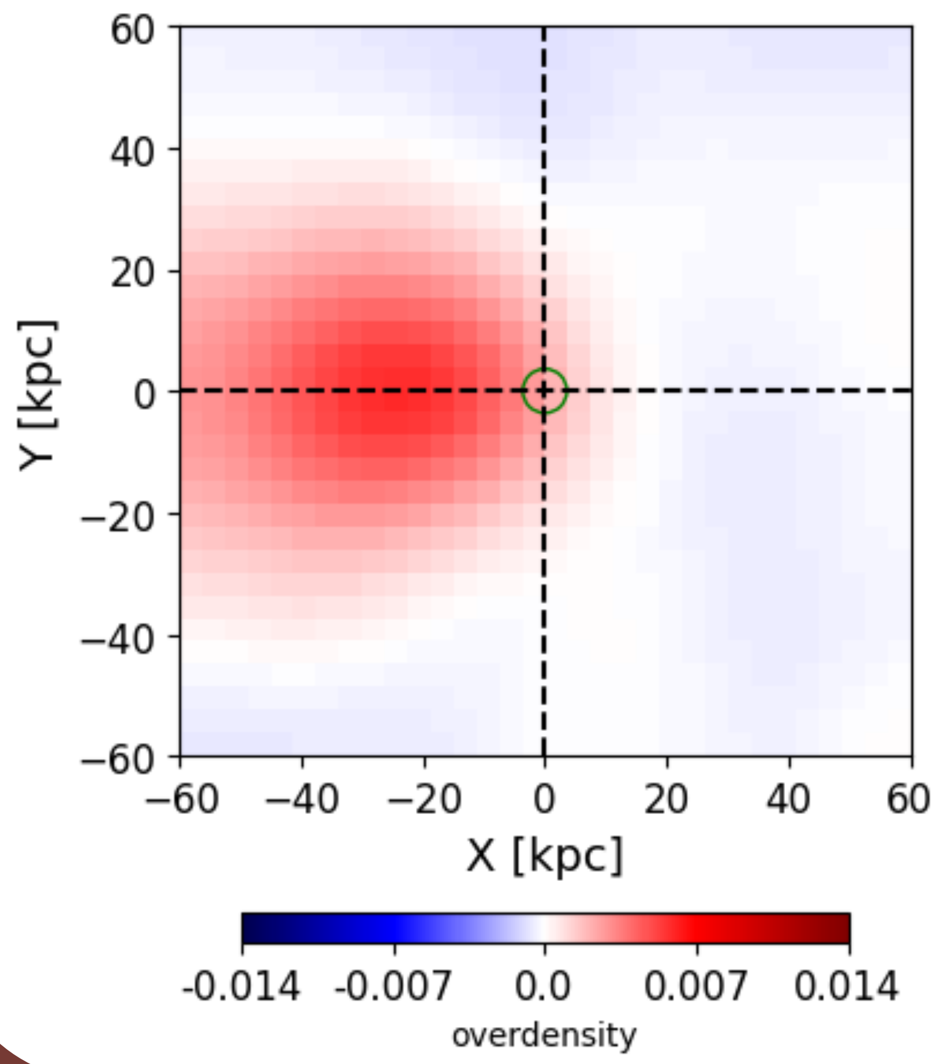
zeV μeV meV eV keV MeV GeV TeV

$10^{5}\ M_\odot$

10^{71} eV

Macroscopic quantum effects

$m_{\mathrm{DM}} \gtrsim 10^{-22}$ eV



See Sven Põder's poster

Must fit inside dwarf galaxies

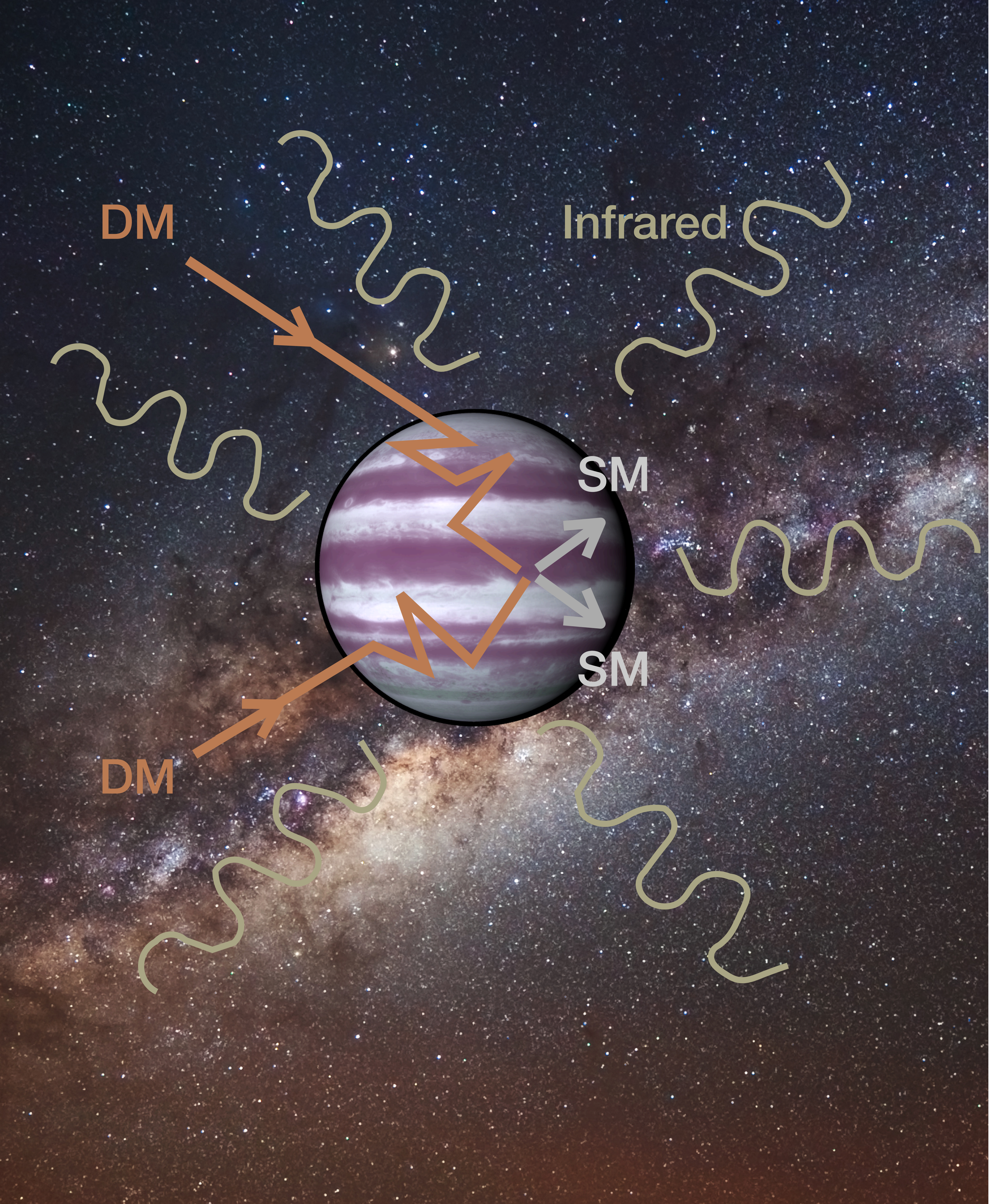
$m_{\mathrm{DM}} \lesssim 10^{71}$ eV

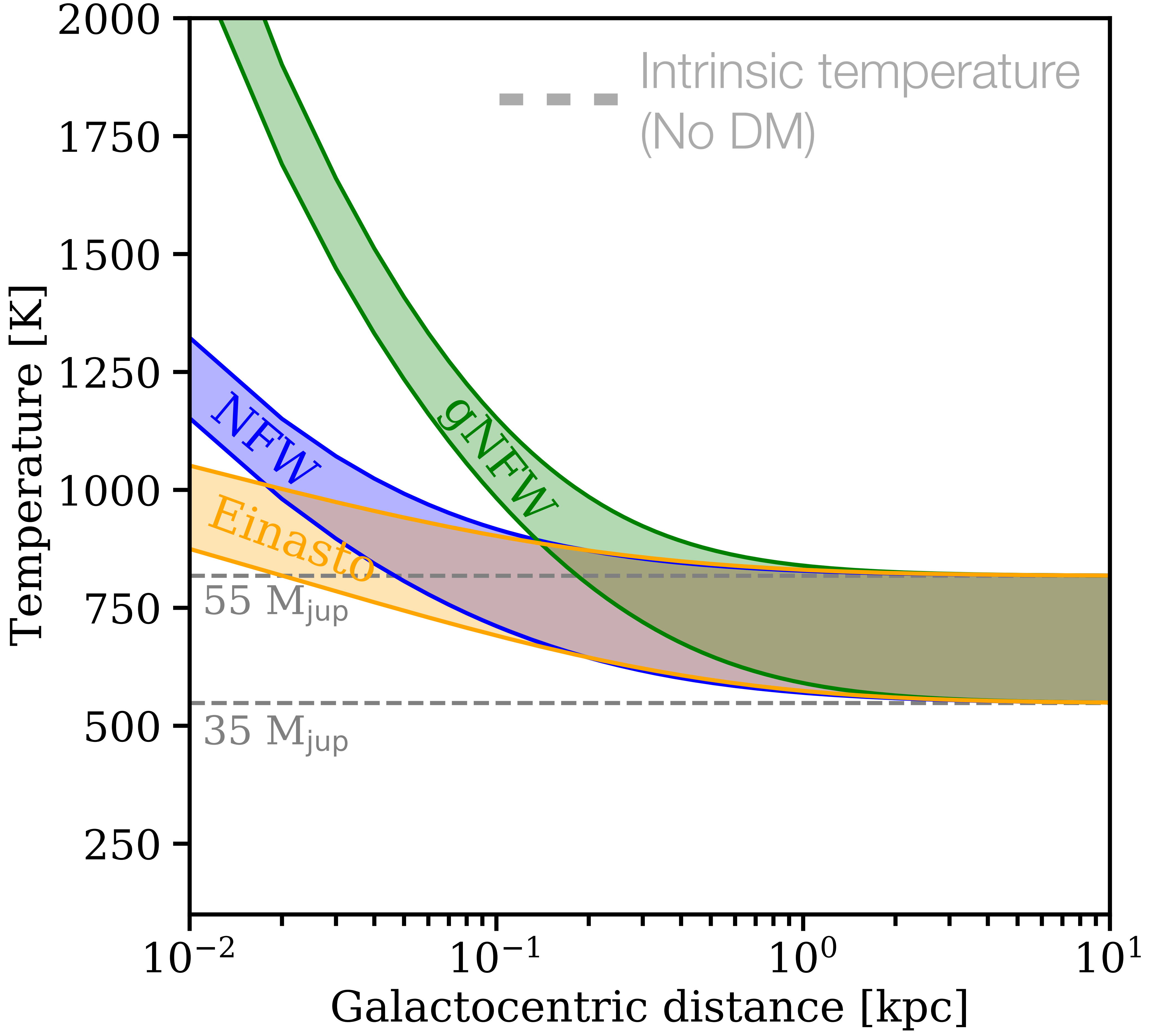
Dark Matter particle landscape

Exoplanets & Brown Dwarfs are new, excited and powerful detectors of DM

Leane & Smirnov [2010.00015]
Acevedo et al. [2303.01516]
Benito et al. (very soon to appear on arXiv)

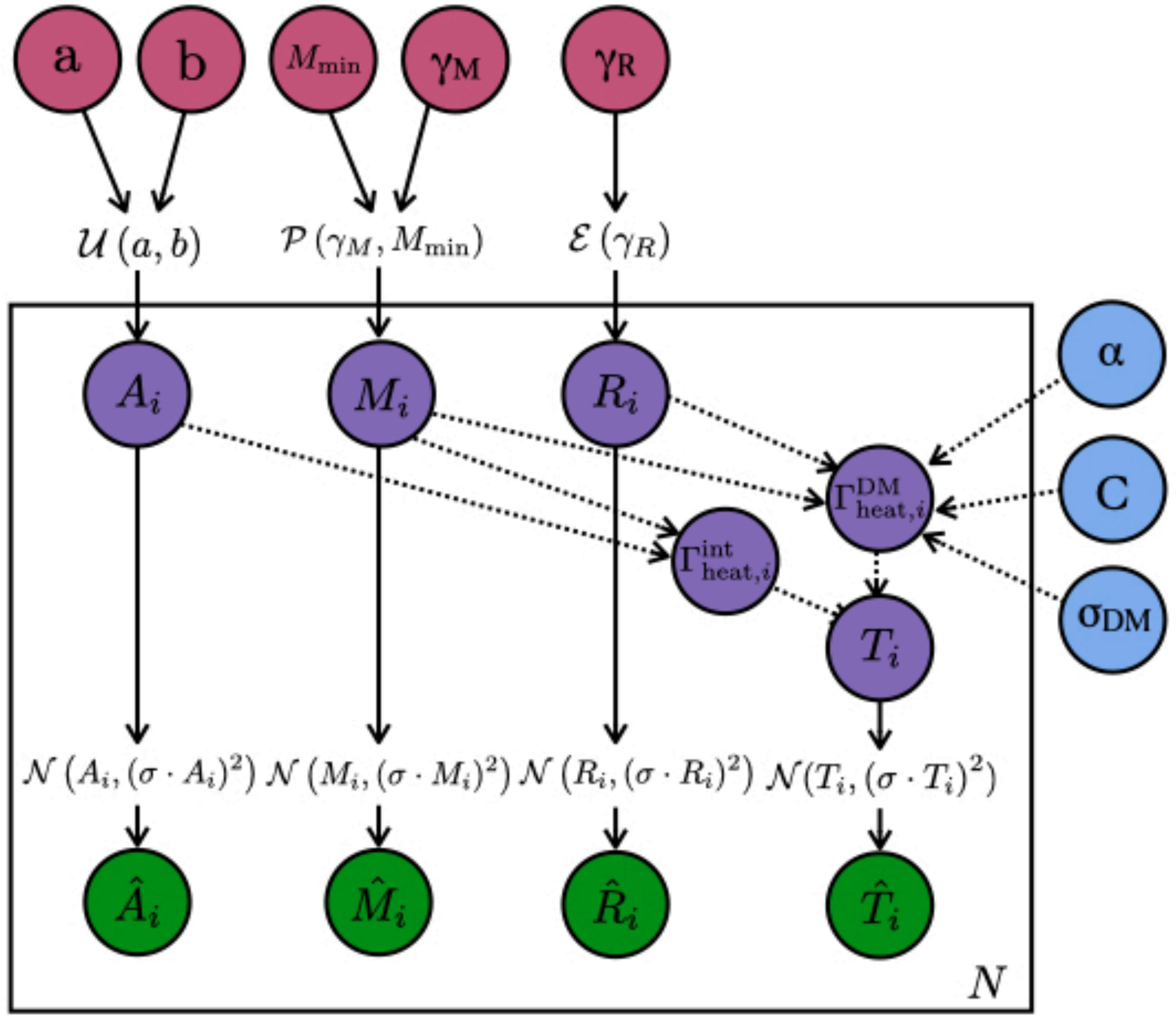
Indirect **D**ark **M**atter search





Bayesian **H**ierarchical **M**odel

Details & results in poster, during coffee break, soon arXiv



Konstantin Karchev & I
would be happy to discuss
further