DR DAVID HARVEY

PI ***DARKSKIES*** SEFRI FUNDED ERC STG

A DEEP LEARNING FRAMEWORK FOR ROBUST AND TRANSPARENT COSMOLOGICAL INFERENCE

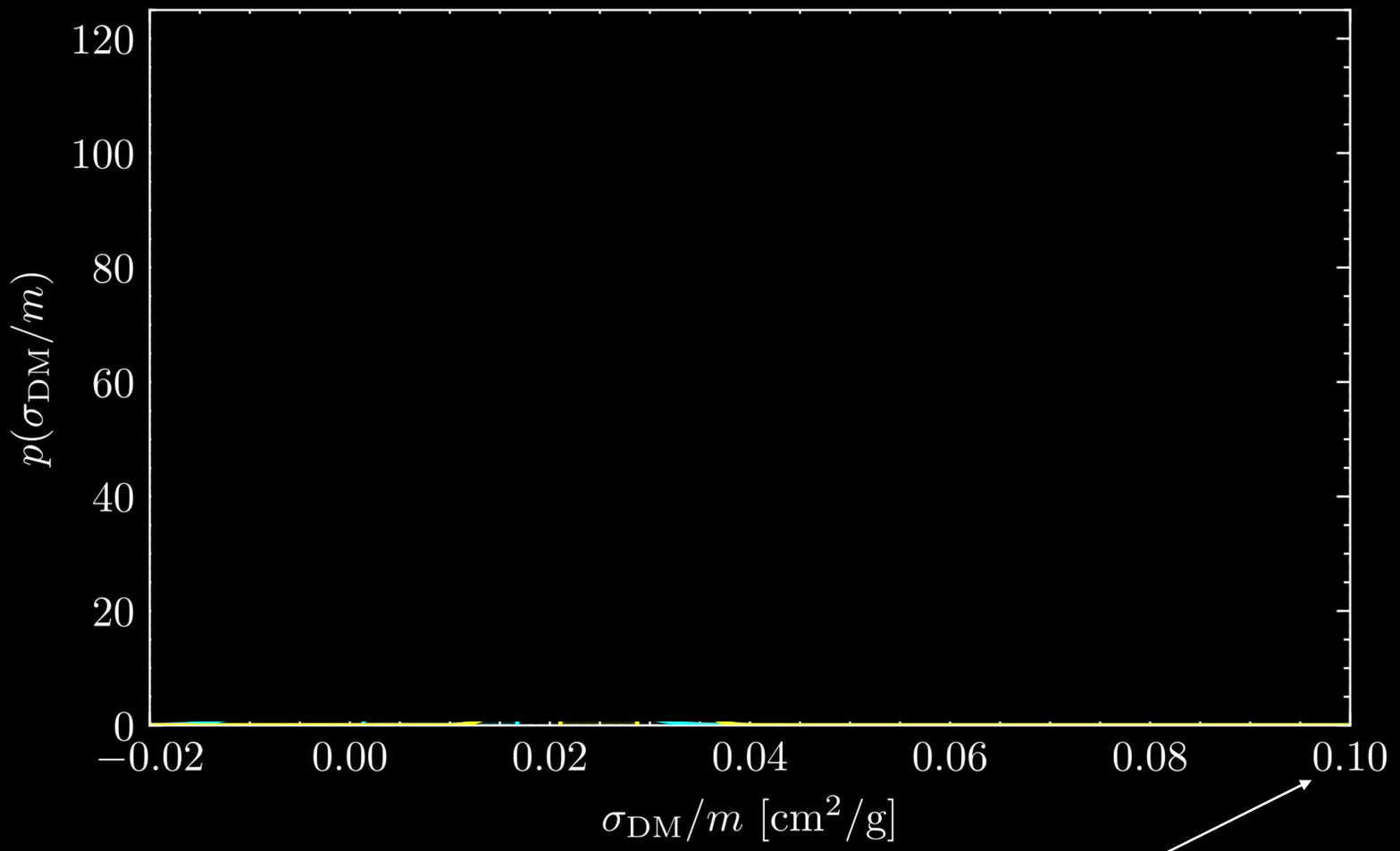
Ethan Tredidga

Ismail Nejjar

Olga Fink


THERE EXISTS A SOCIOLOGICAL BARRIER TO DISCOVERY
ASSOCIATED WITH DEEP LEARNING

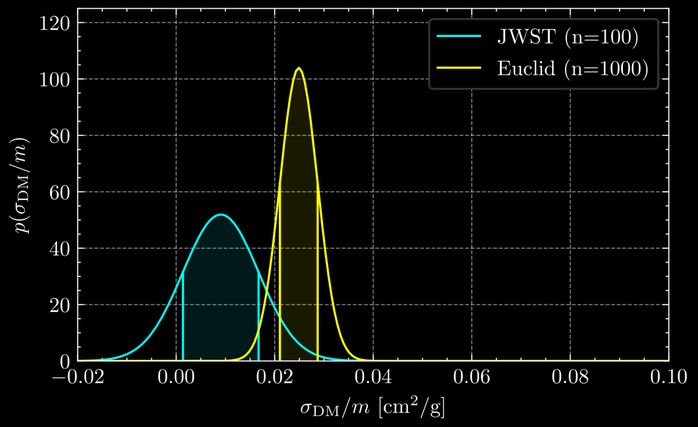
We need to build trust since ML does present an opportunity

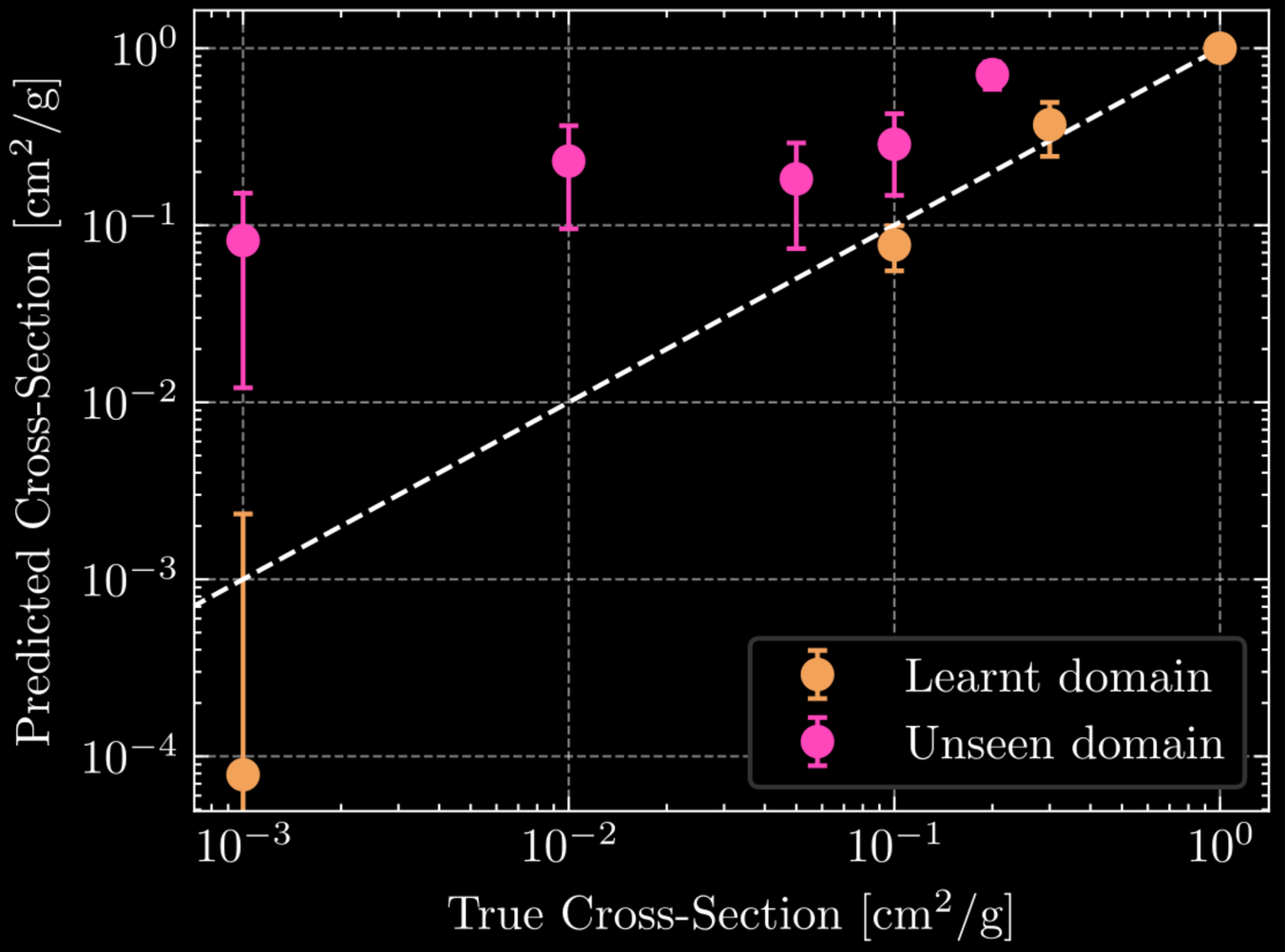


Limit with classic methods

Harvey 2024

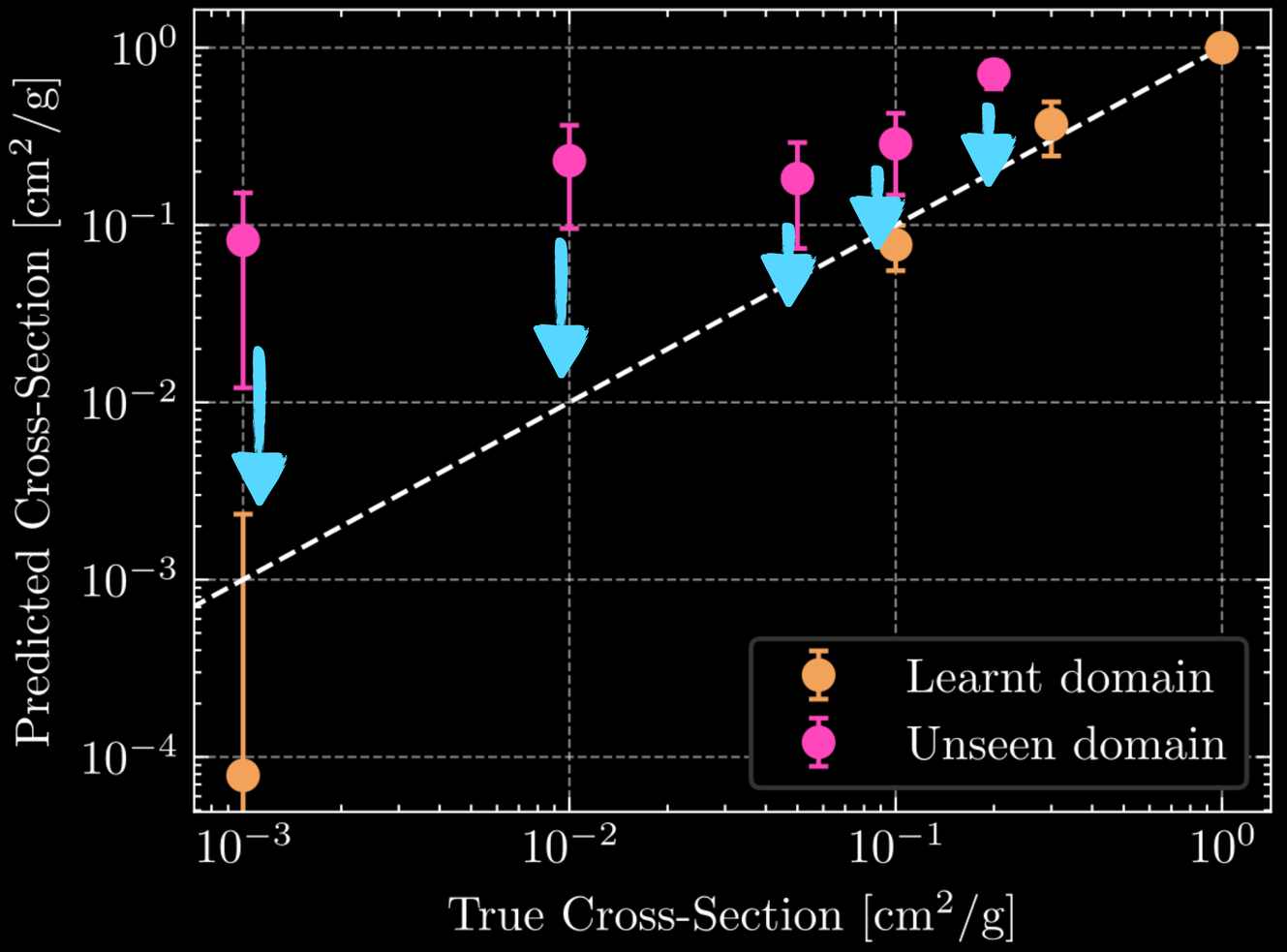
Astronomical algorithms can suffer badly from fine-tuning





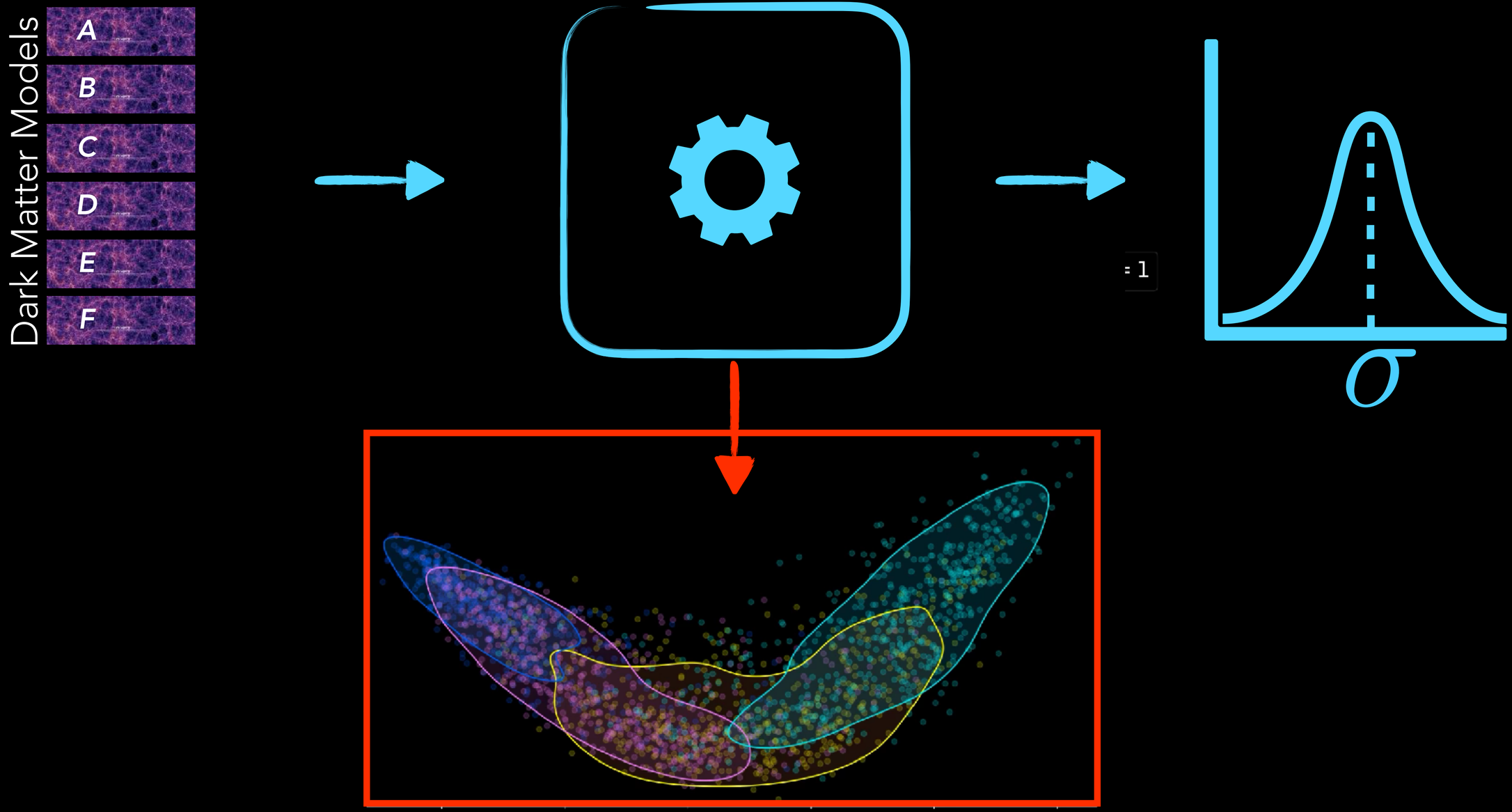
Harvey 2024

Not only do we need **domain generalisation**.
But ***empirical tests*** built in to our ML pipelines in order to deliver trustworthy inference.

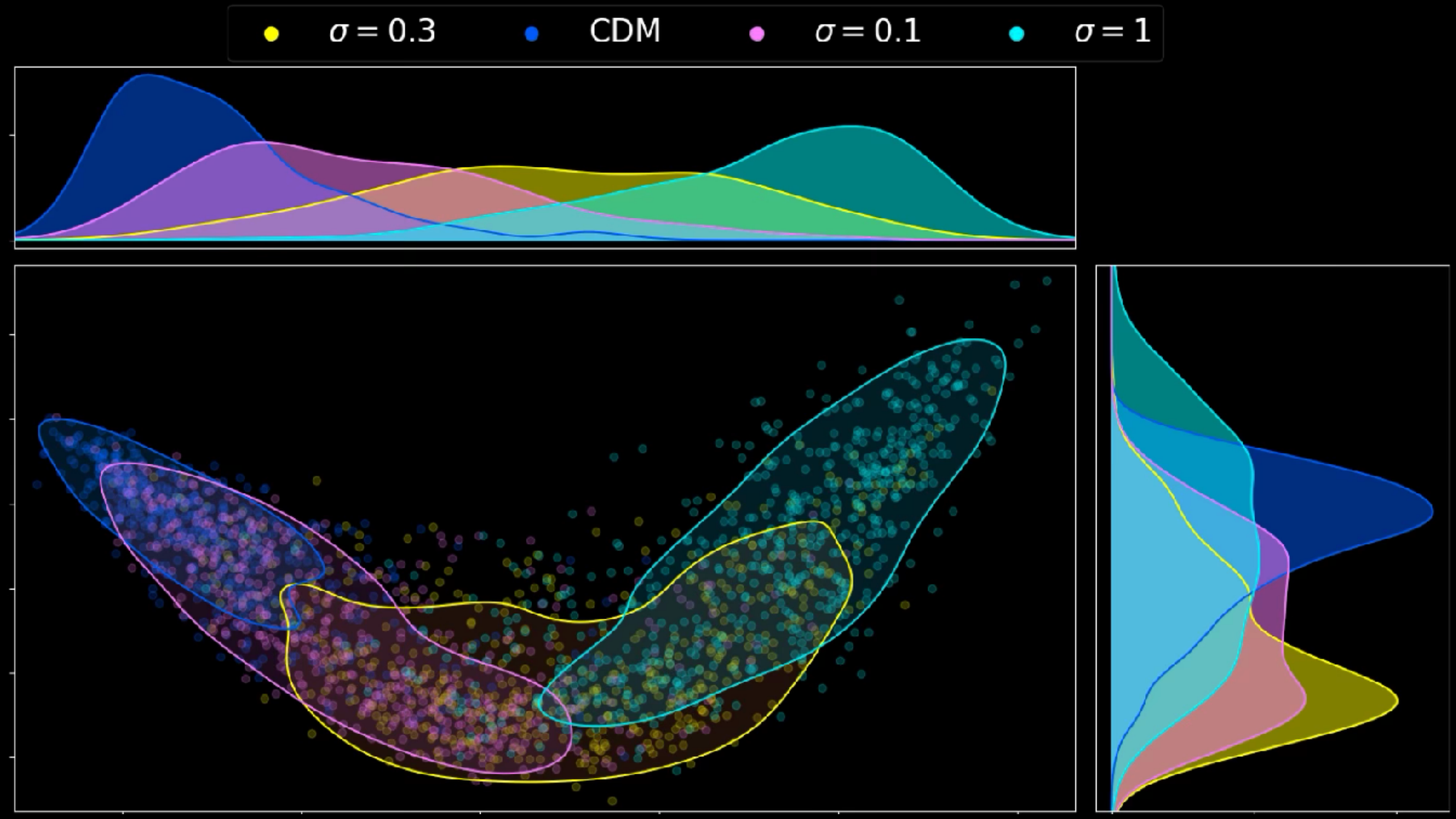


empirical tests

Deep Compact Clustering

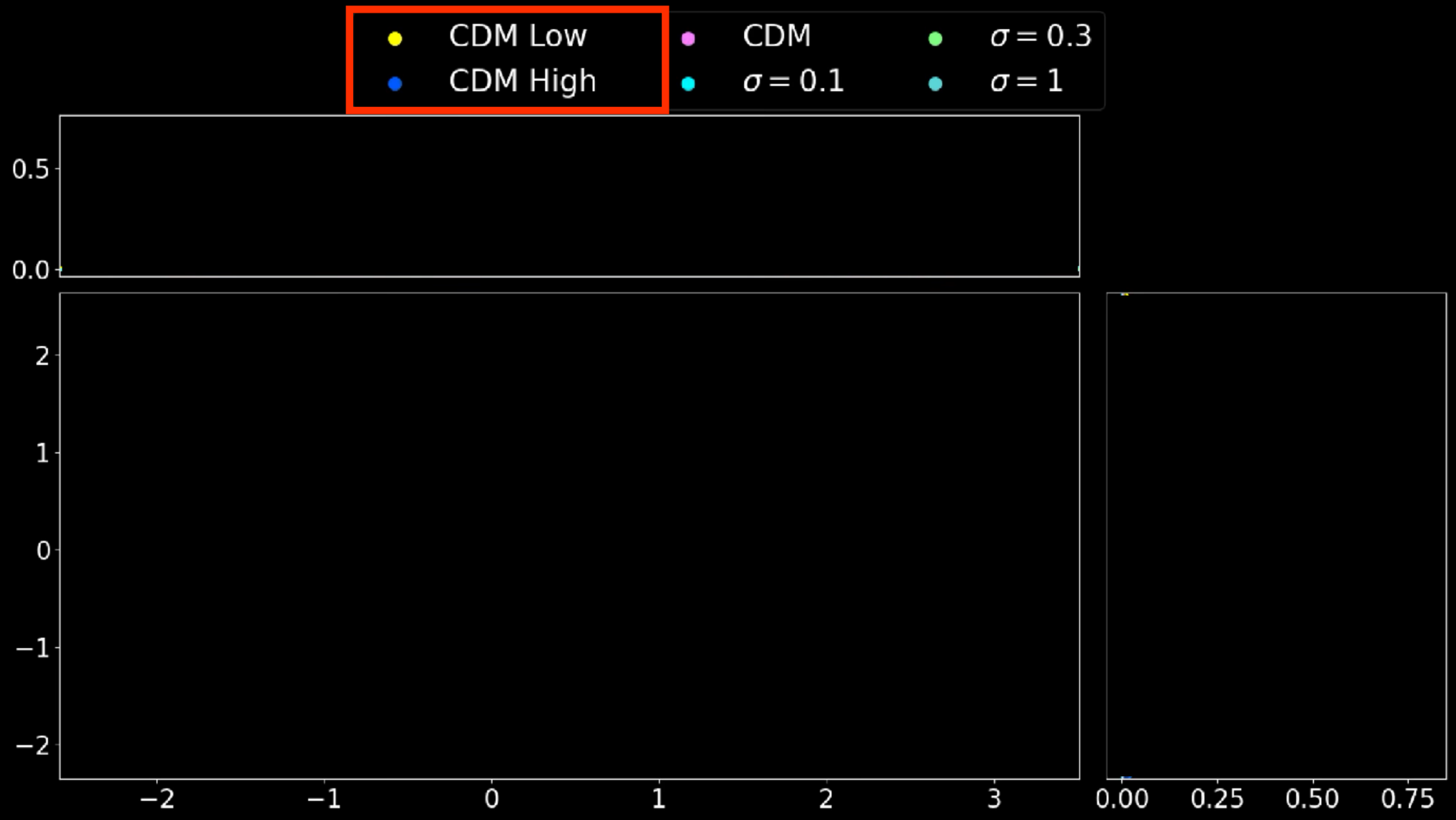


Deep Compact Clustering for inference.

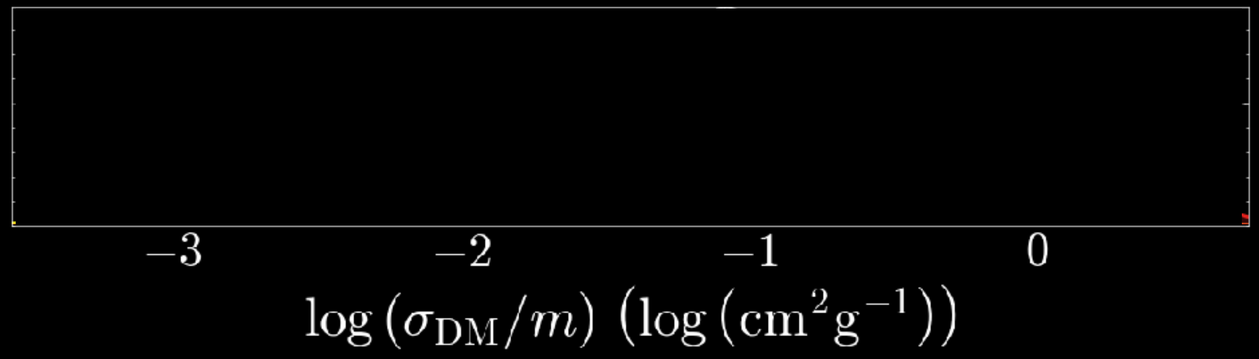


Tredidga + 25 *submitted*

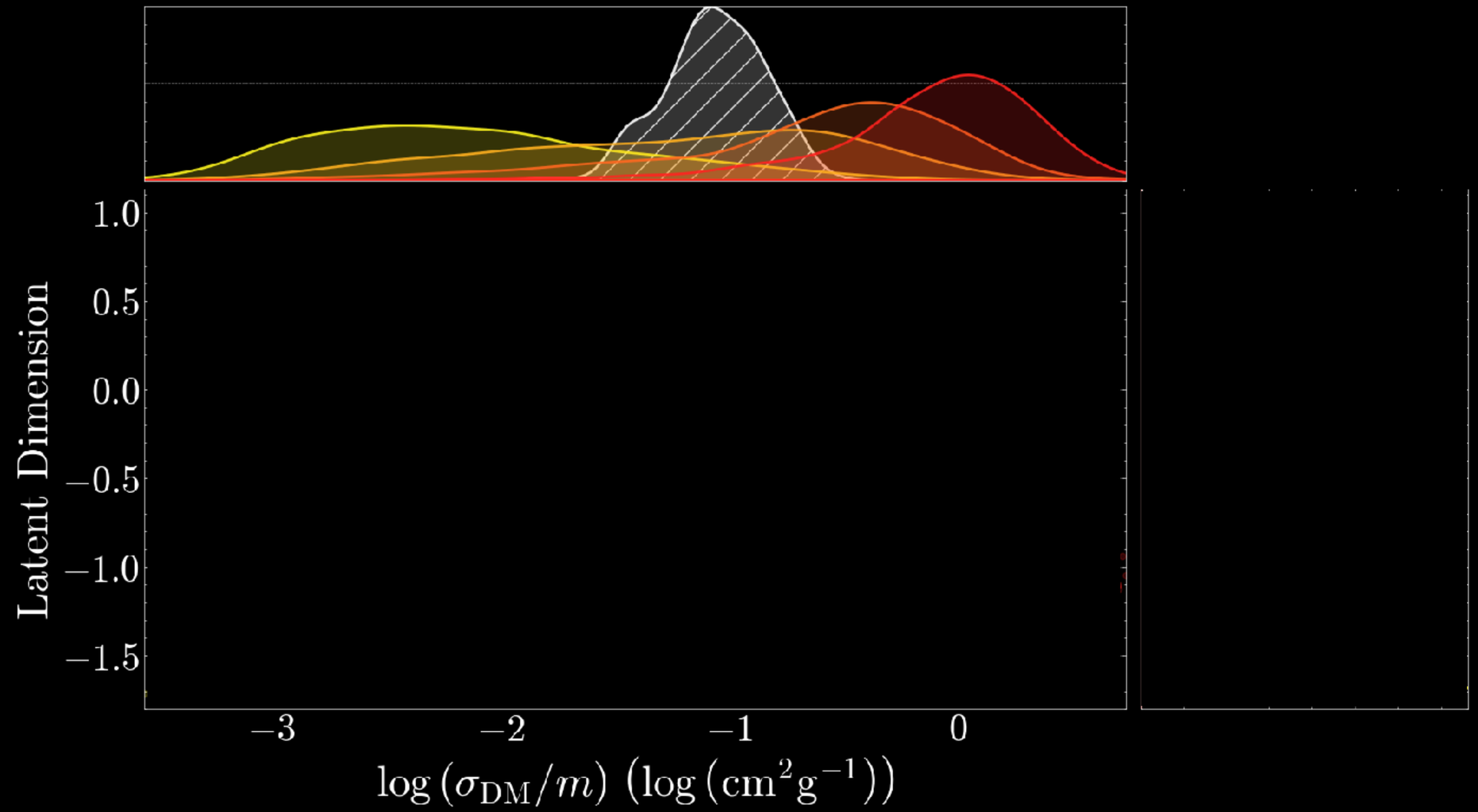
Deep Compact Clustering for interpretation..



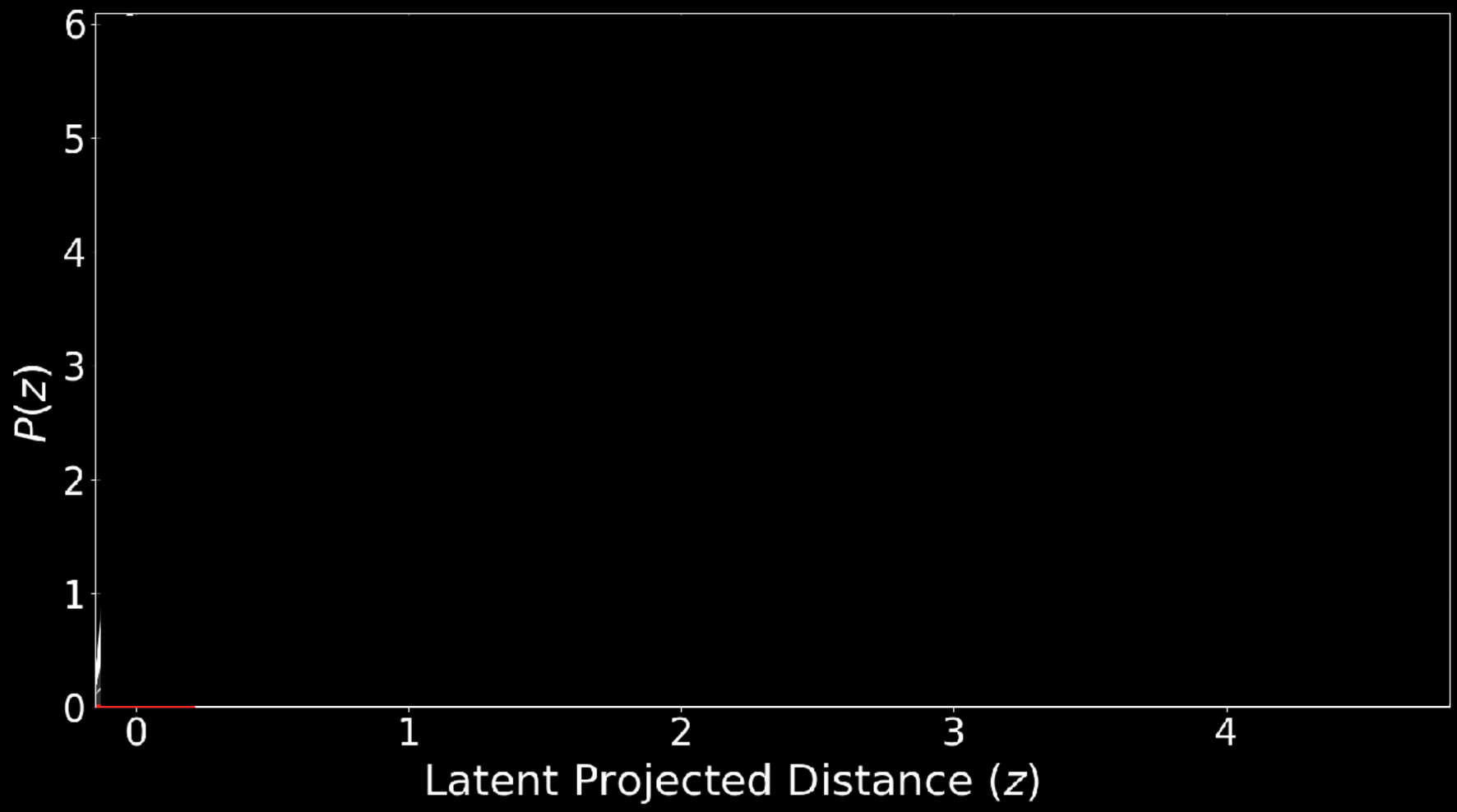
Deep Compact Clustering for out-of-domain tests.



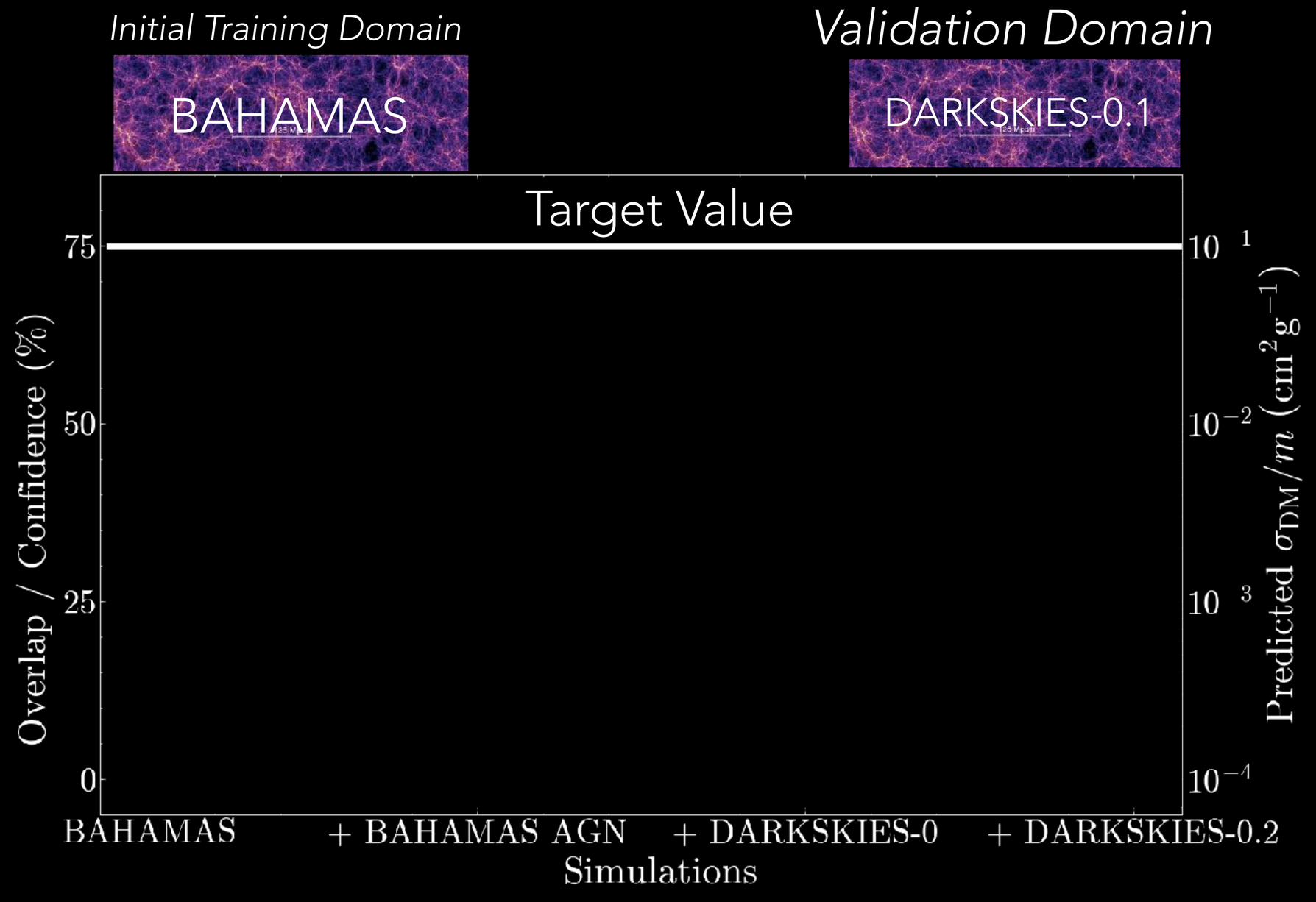
Deep Compact Clustering for out-of-domain tests.



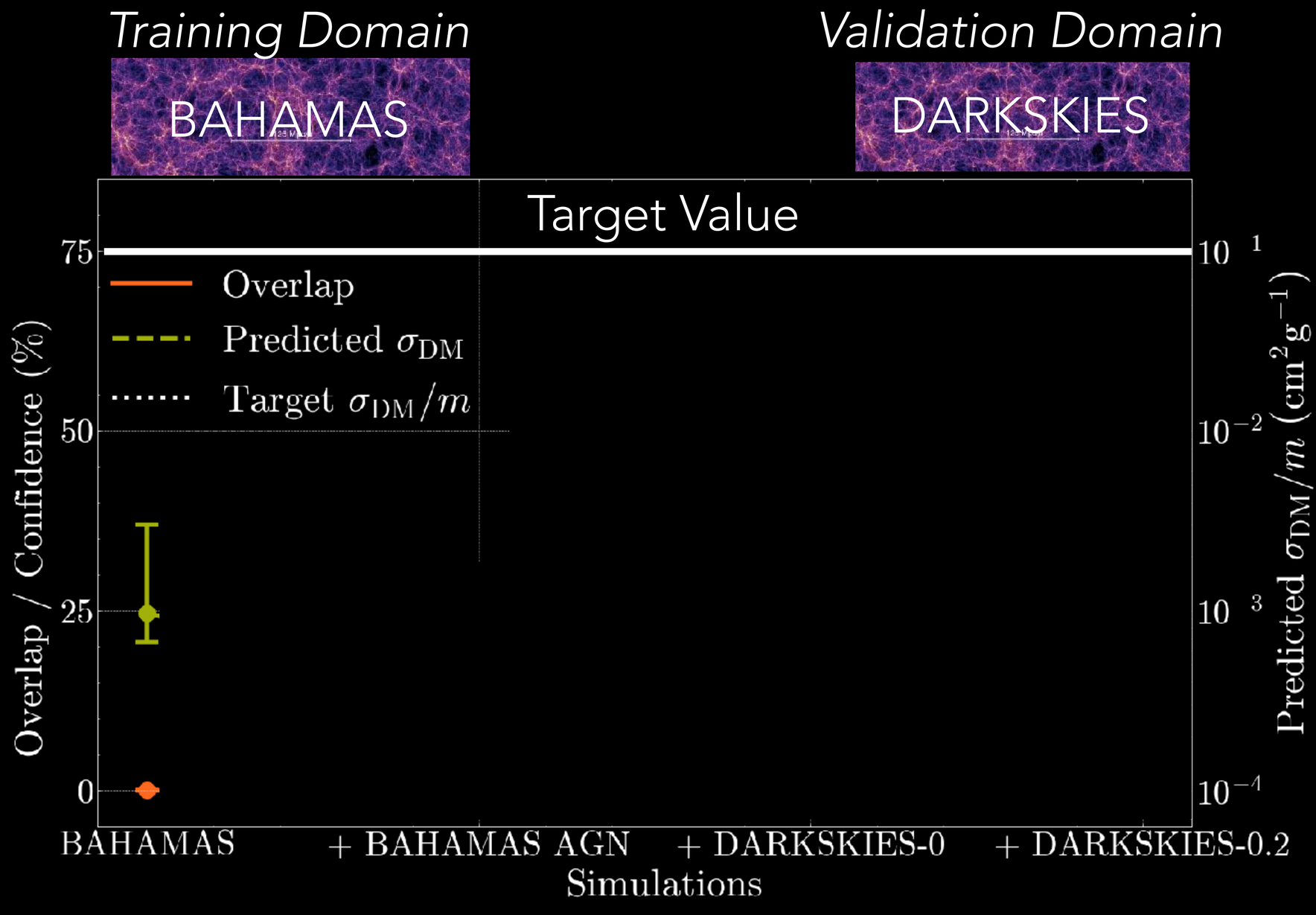
The overlap of the projected latent space distance gives us a degree of confidence that the model recognises the data it has been given.



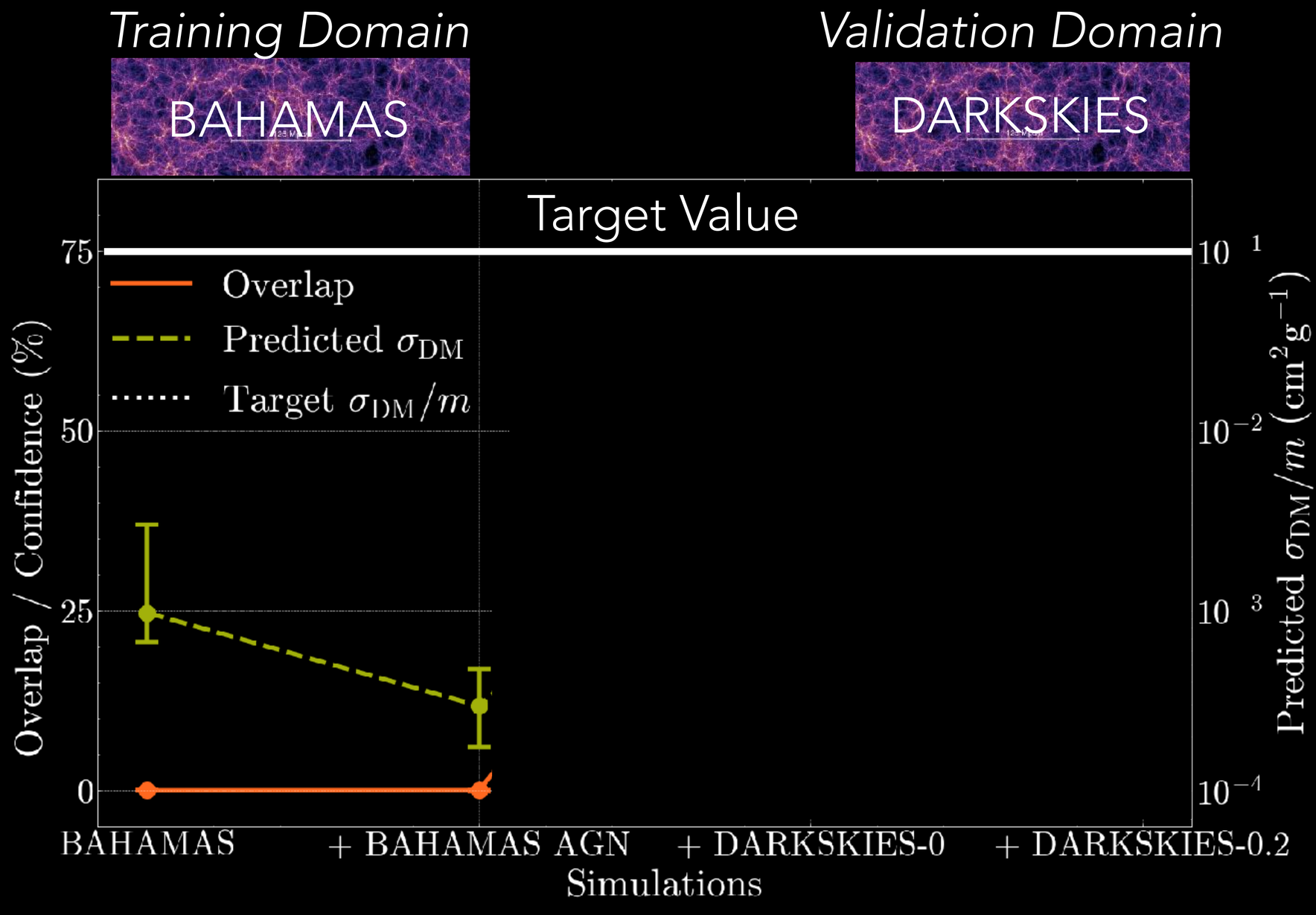
Overlap gives us an empirical confidence test that the model is not extrapolating to get an estimation.



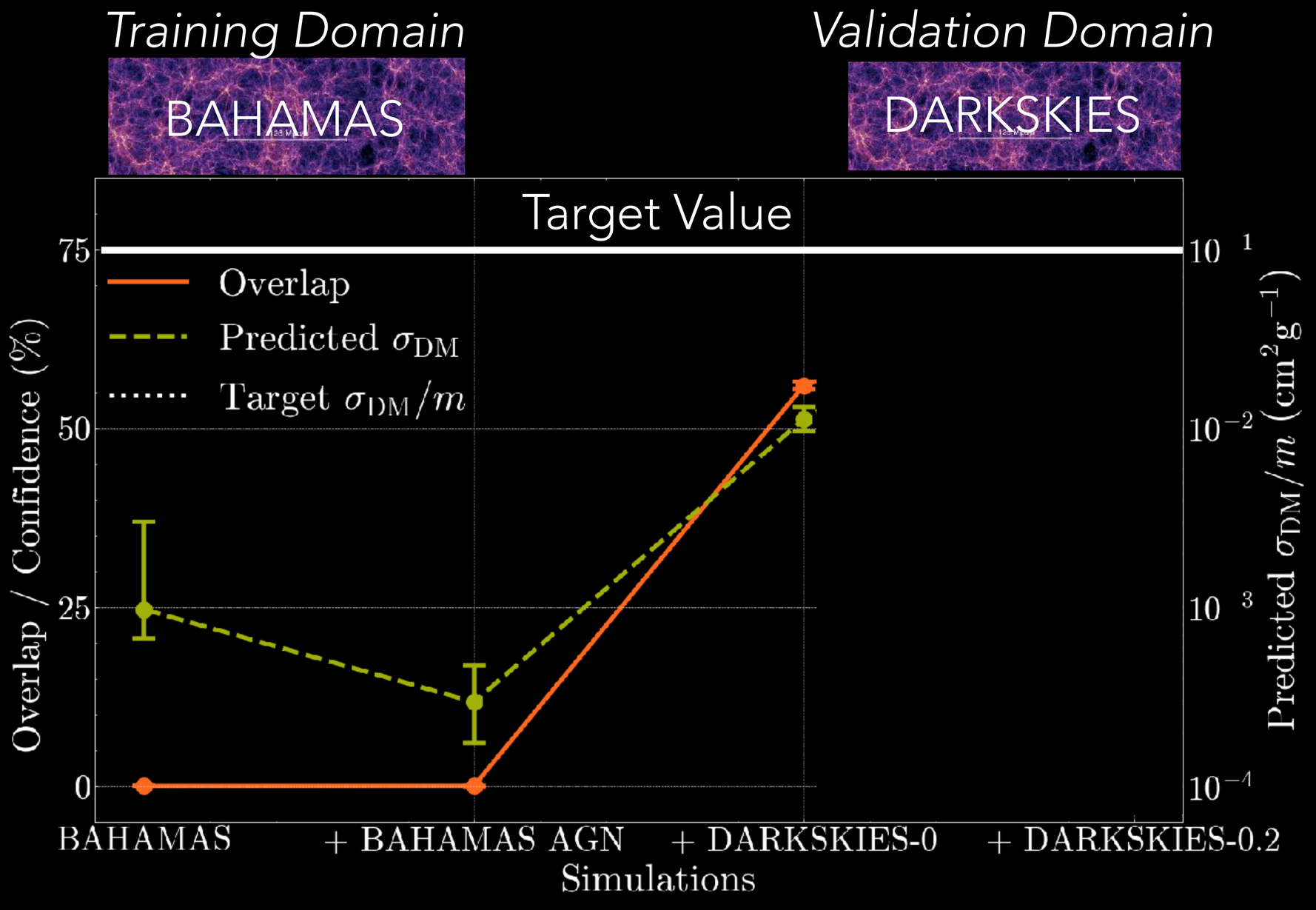
Overlap gives us an empirical confidence test that the model is not extrapolating to get an estimation.



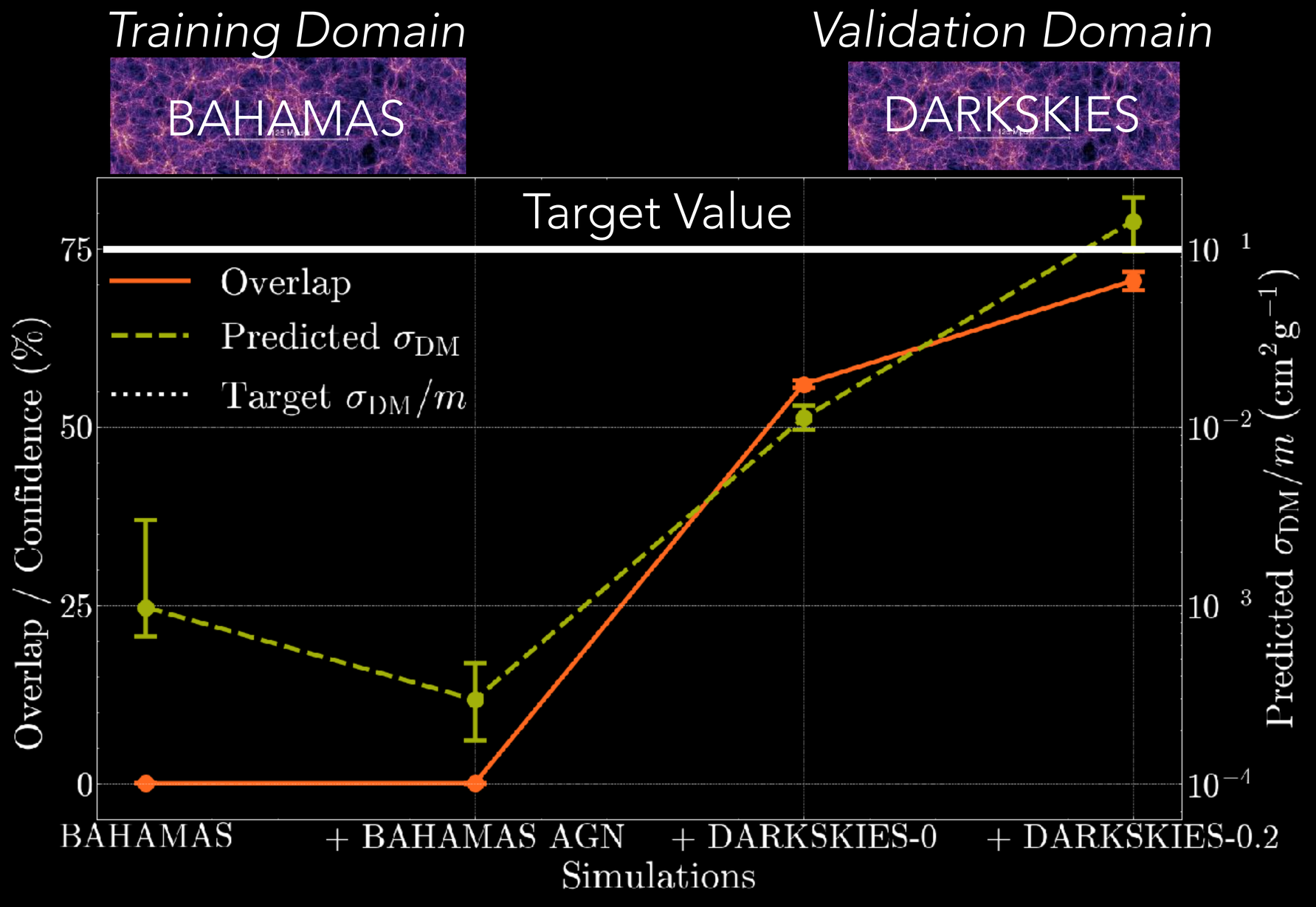
Overlap gives us an empirical confidence test that the model is not extrapolating to get an estimation.



Overlap gives us an empirical confidence test that the model is not extrapolating to get an estimation.



Overlap gives us an empirical confidence test that the model is not extrapolating to get an estimation.



We need **domain generalisation** in order to build robust scientific inference.

But we also need ***empirical tests*** built in to our ML pipelines in order to deliver trustworthy inference.