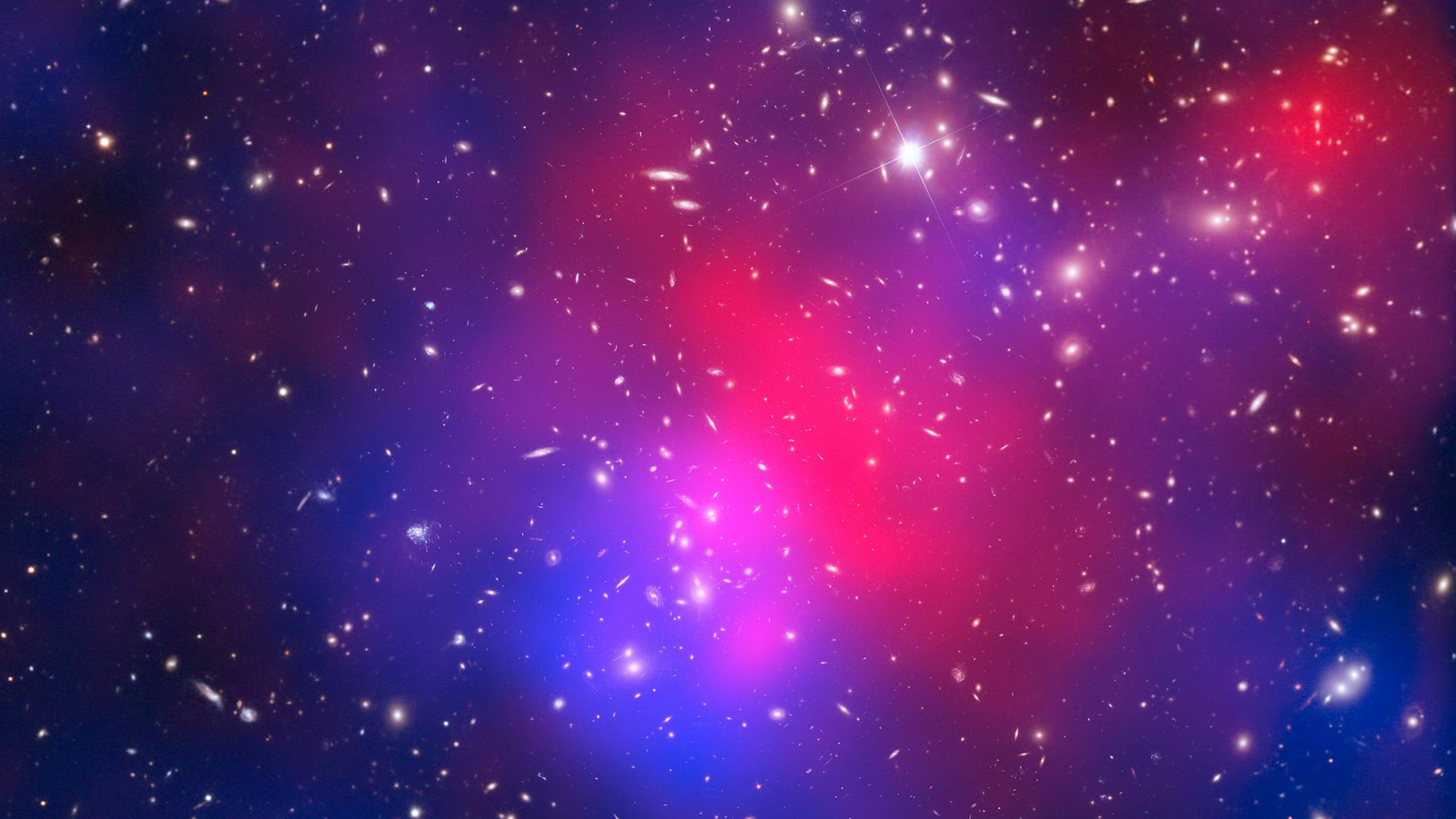
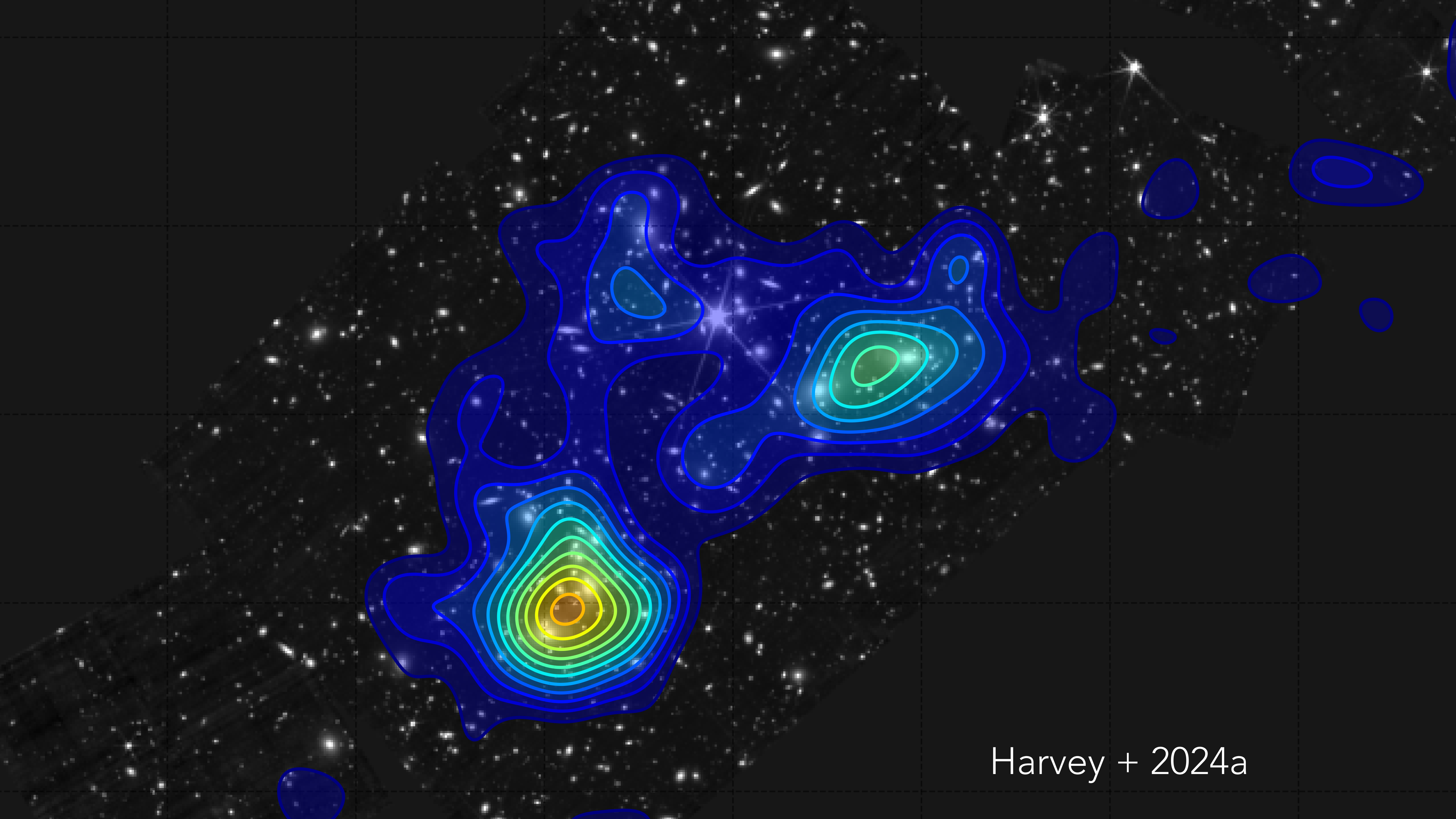


DR DAVID HARVEY

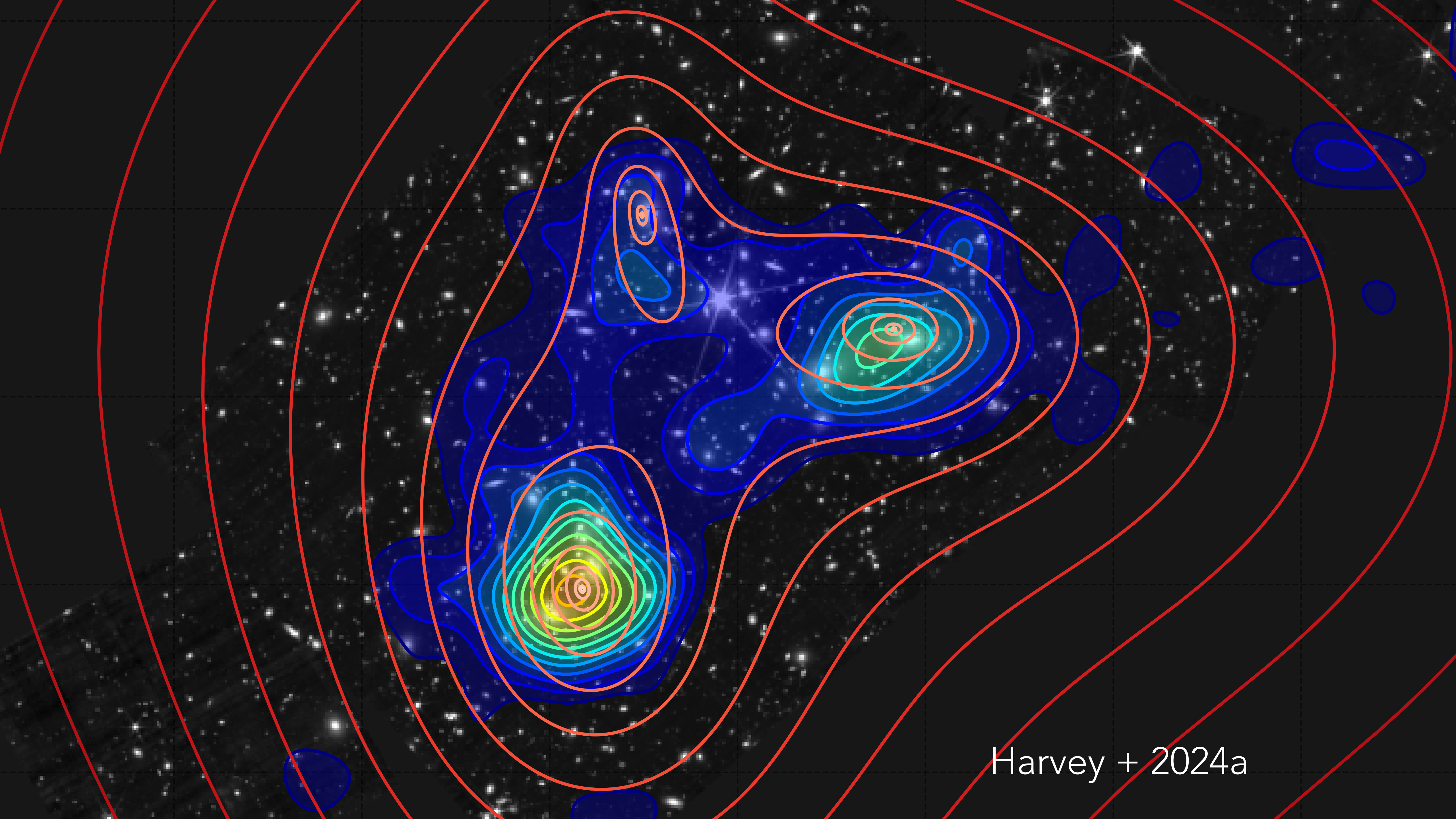
DEEP LEARNING REVEALS EVIDENCE OF SELF-
INTERACTING DARK MATTER IN MASSIVE
CLUSTER ABELL 2744.

ISMAIL NEJJAR, OLGA FINK, ETHAN TREGIDGA, FELIX VECCHI

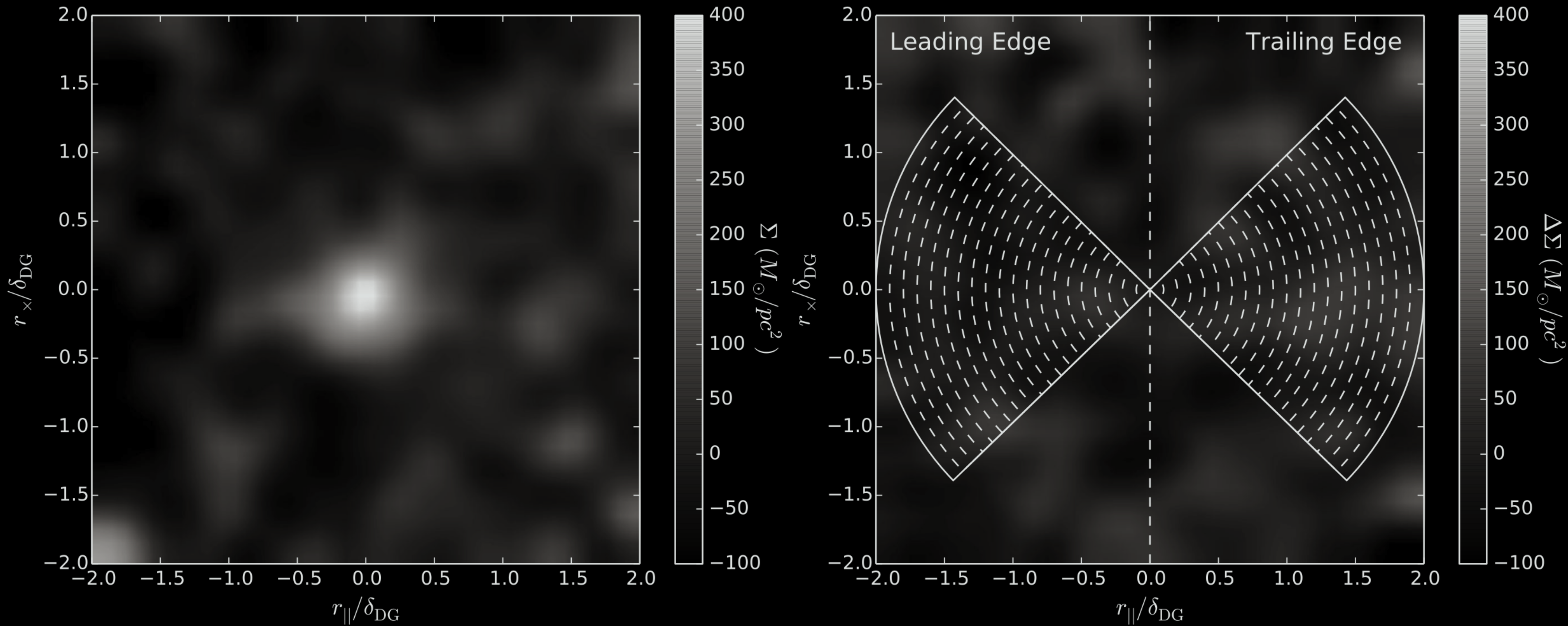




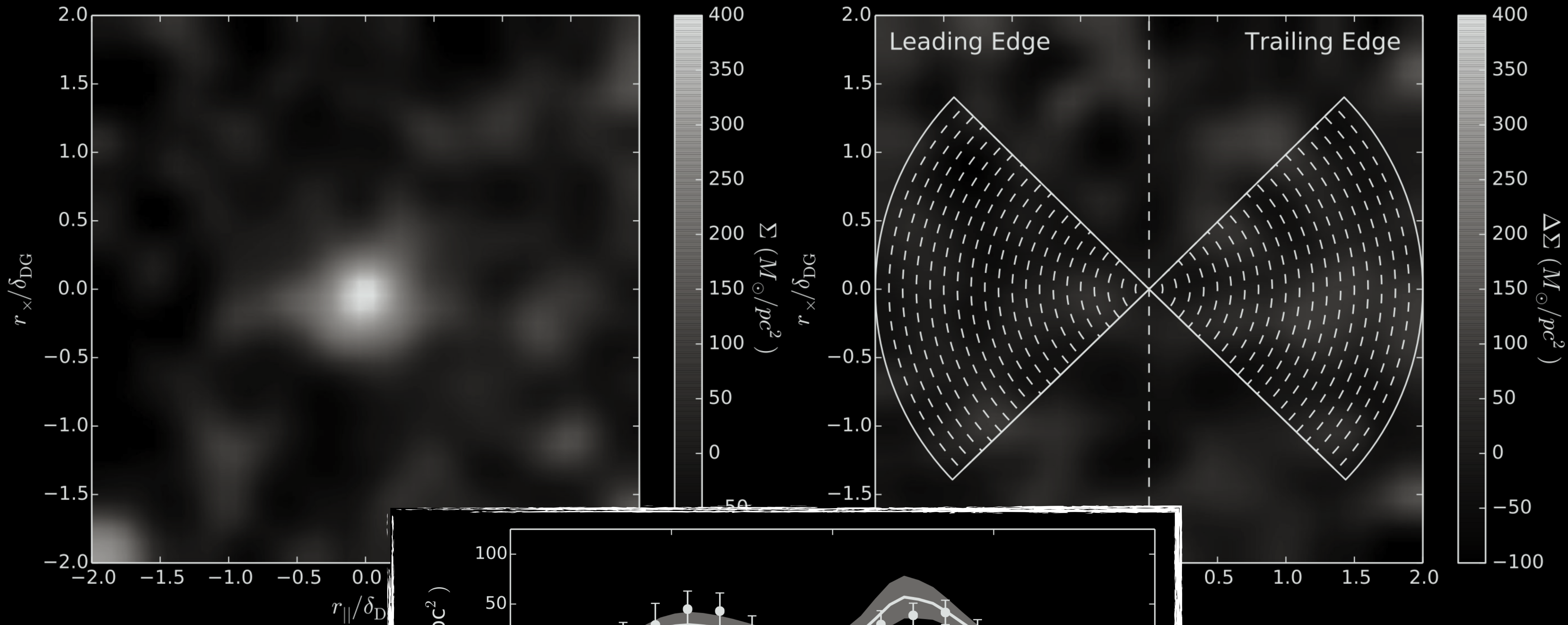
Harvey + 2024a



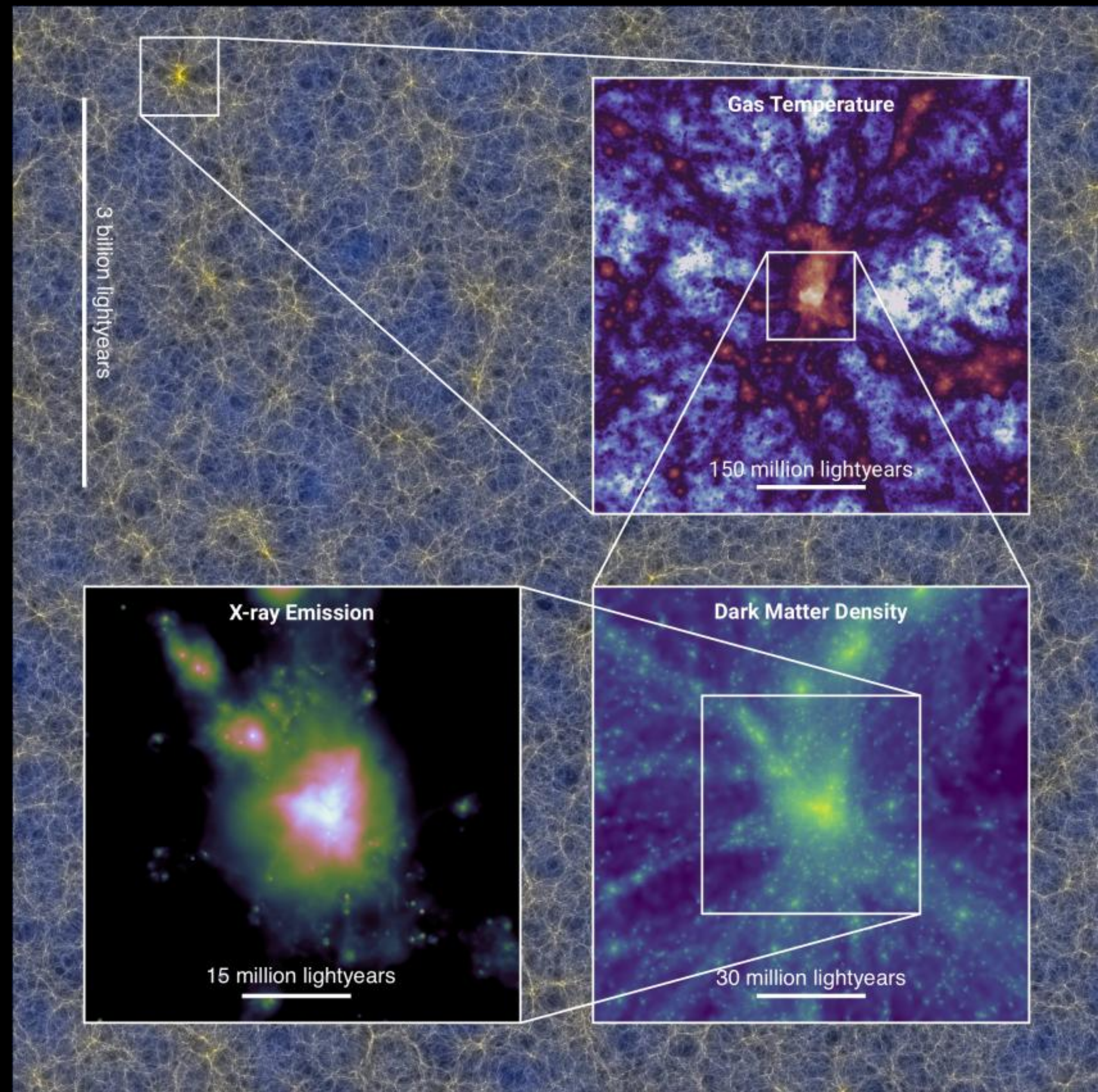
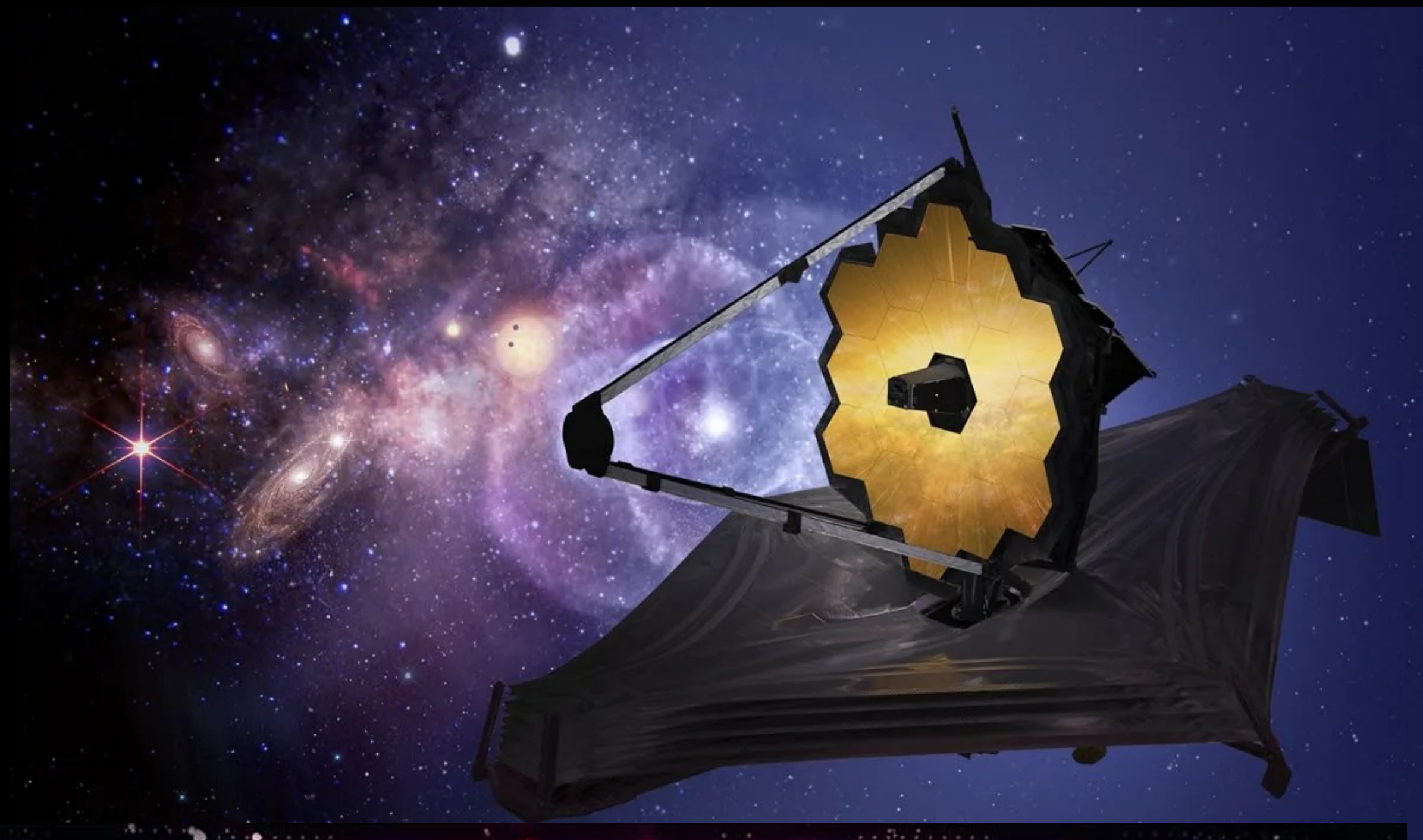
Harvey + 2024a



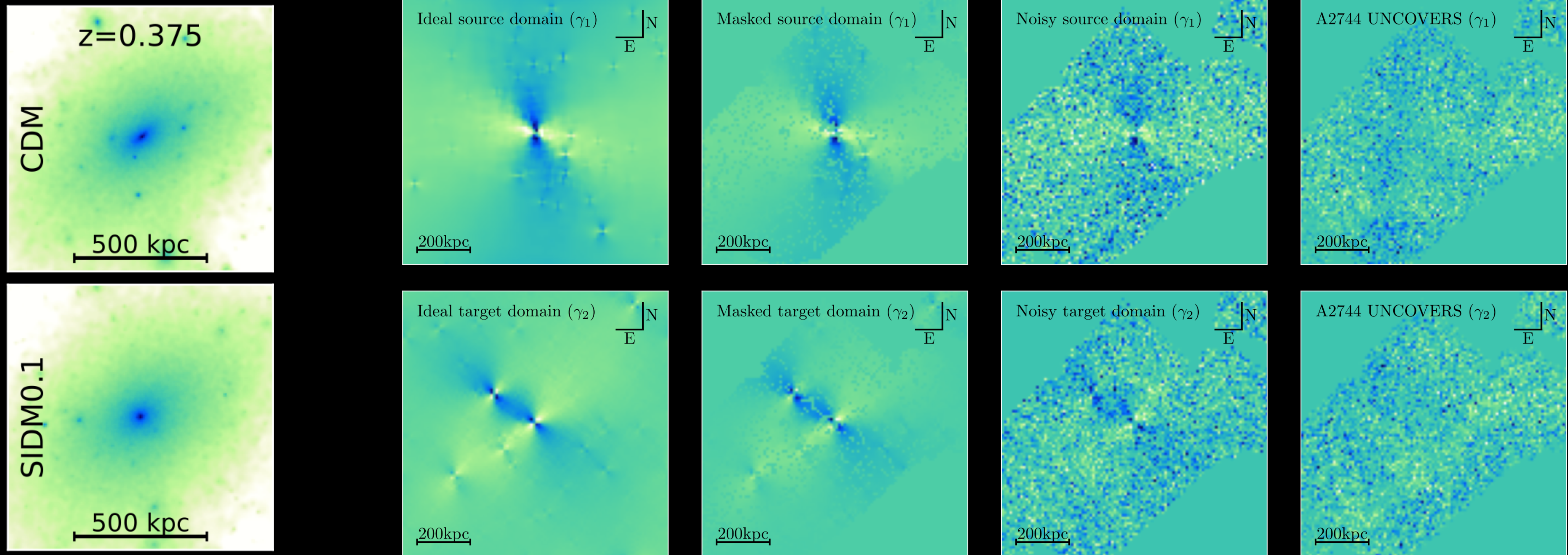
Harvey + 2016



Harvey + 2016

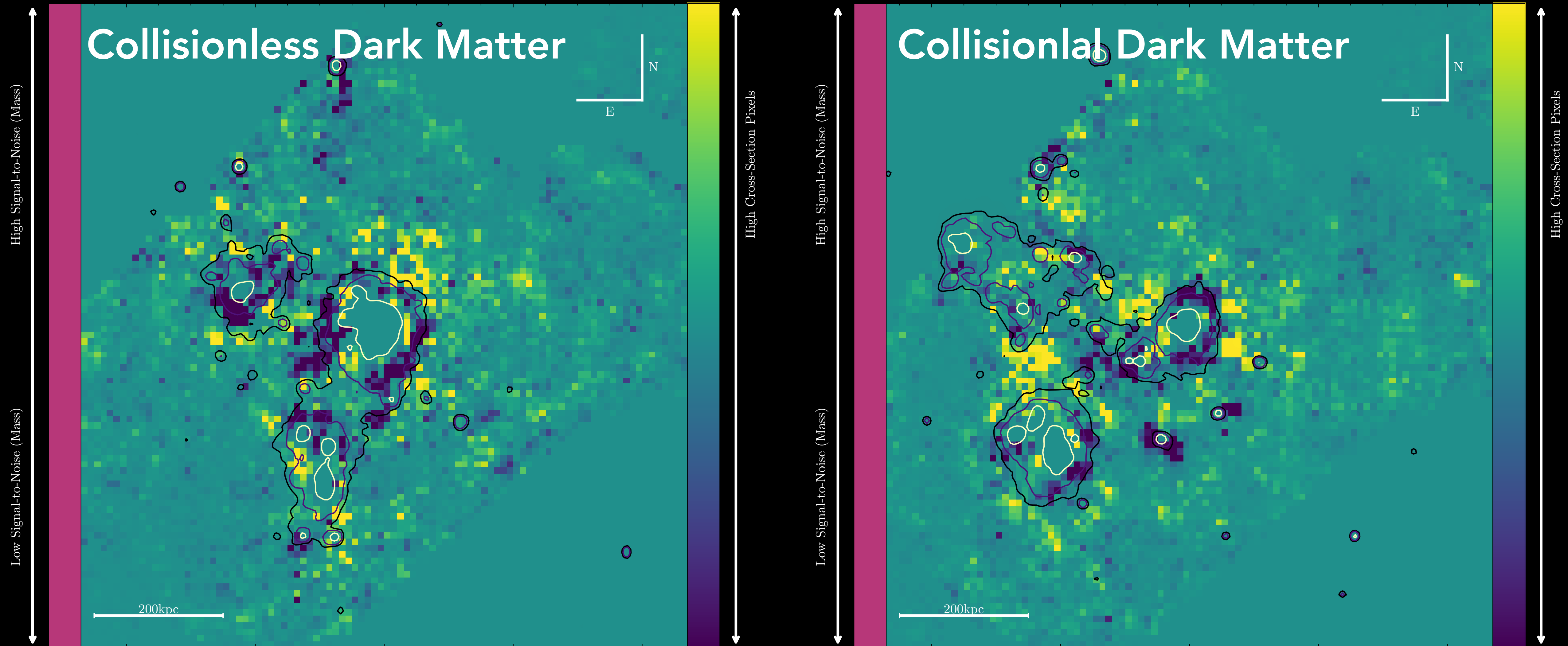


APPLYING COMPUTER VISION TO A2744



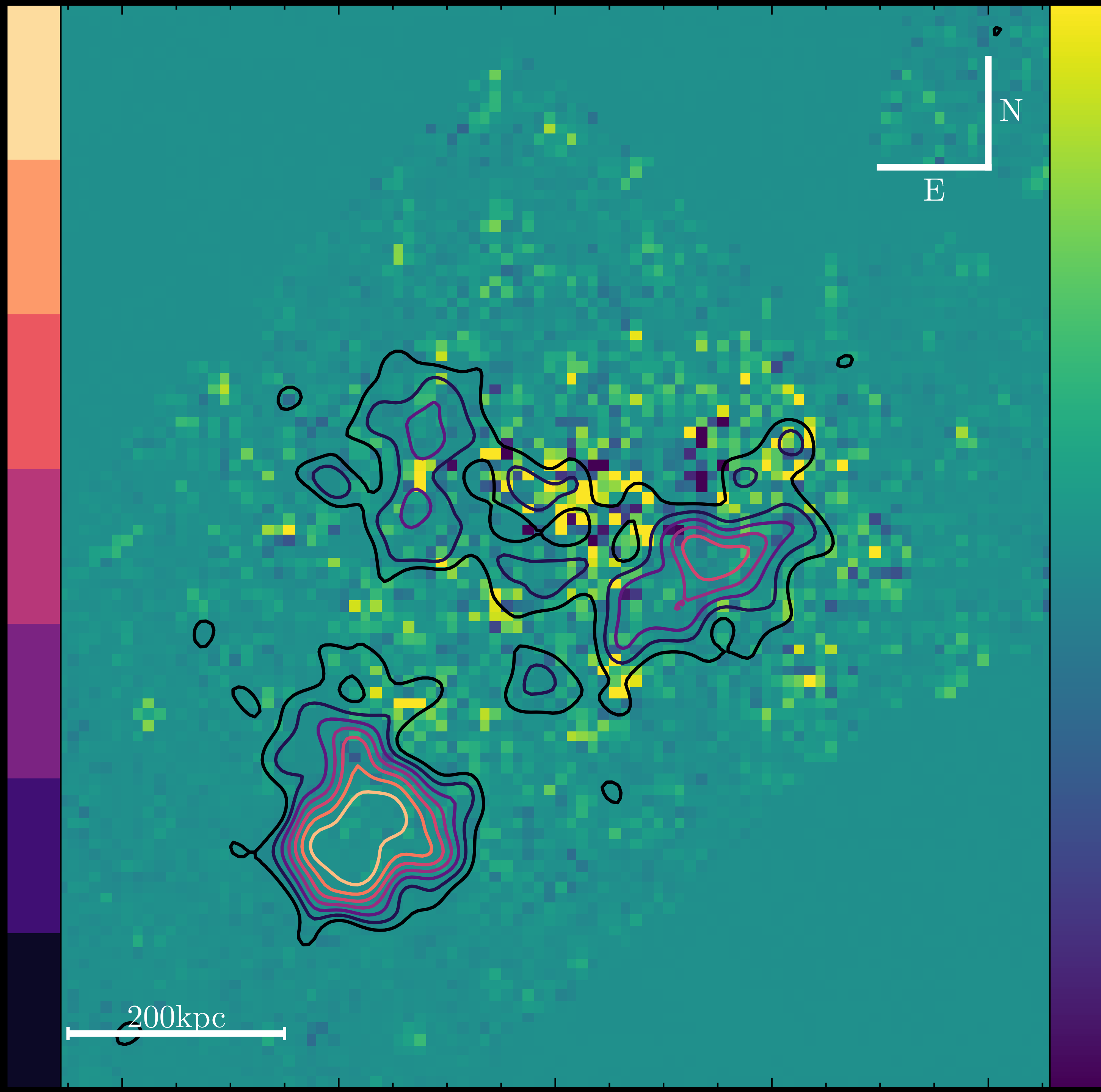
Harvey + 2026

WHAT IS THE ALGORITHM FINDING?



Low Signal-to-Noise (Mass)

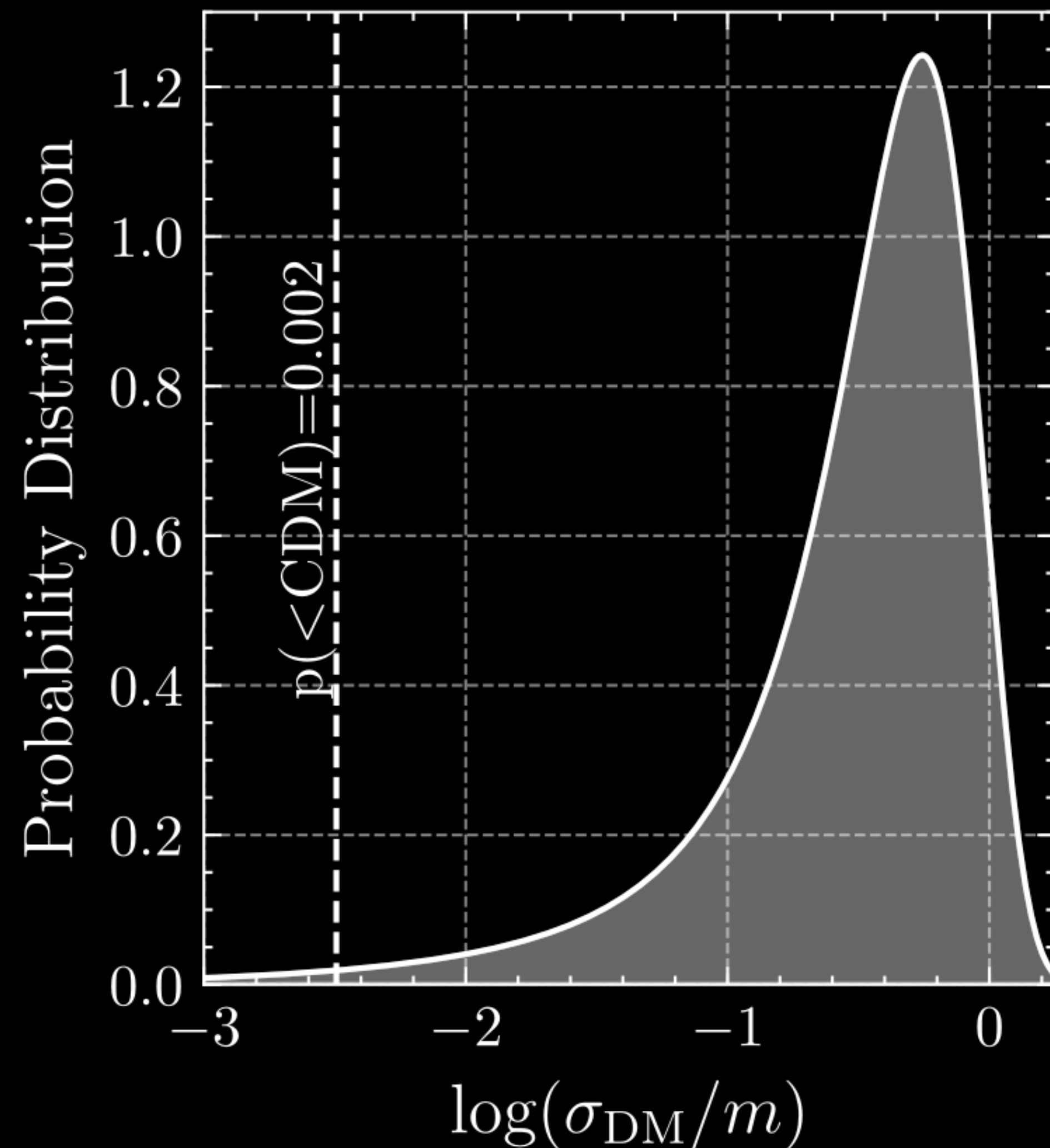
High Signal-to-Noise (Mass)



Low Cross-Section Pixels

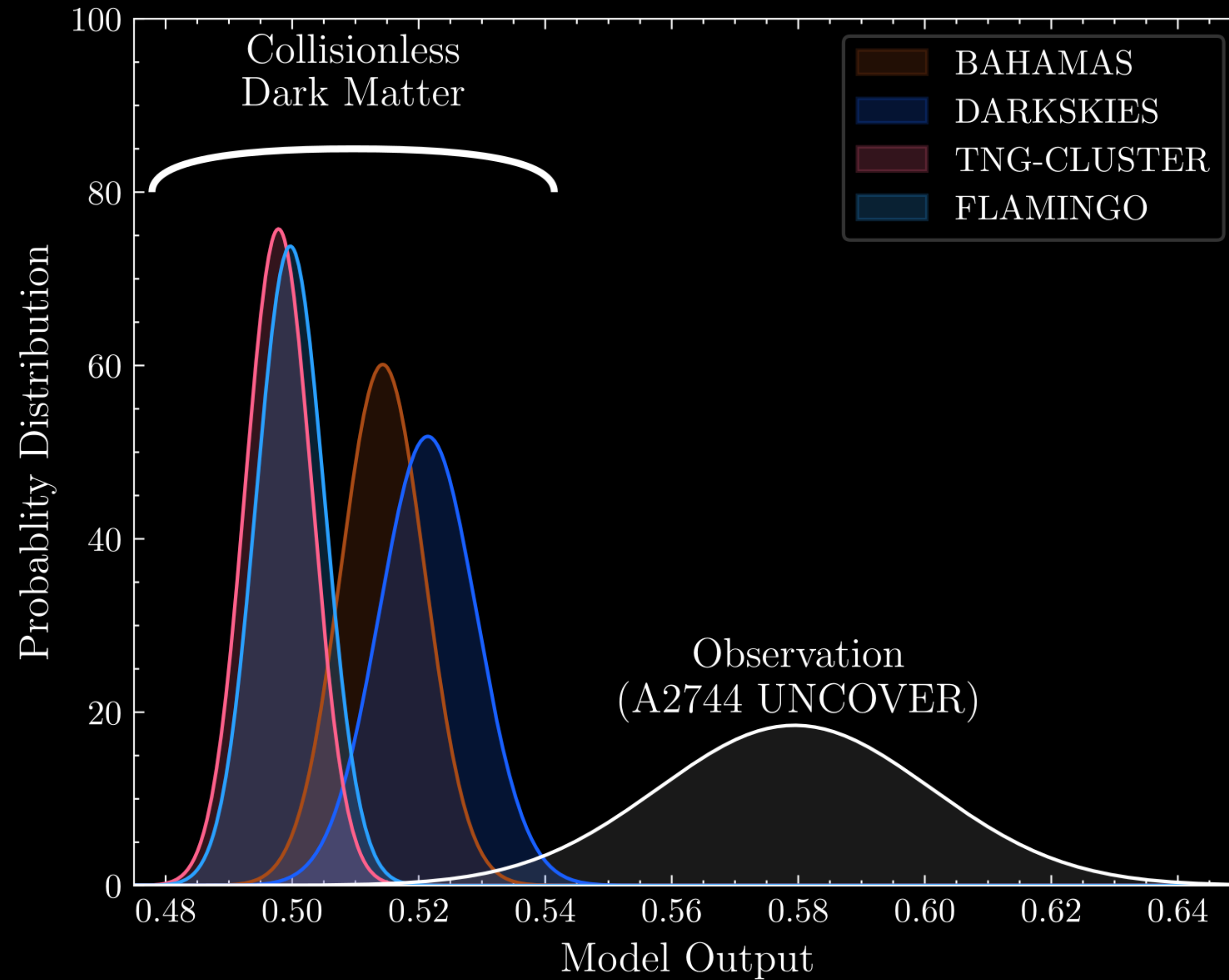
High Cross-Section Pixels

MACHINE LEARNING SUGGESTS A NON-ZERO CROSS-SECTION

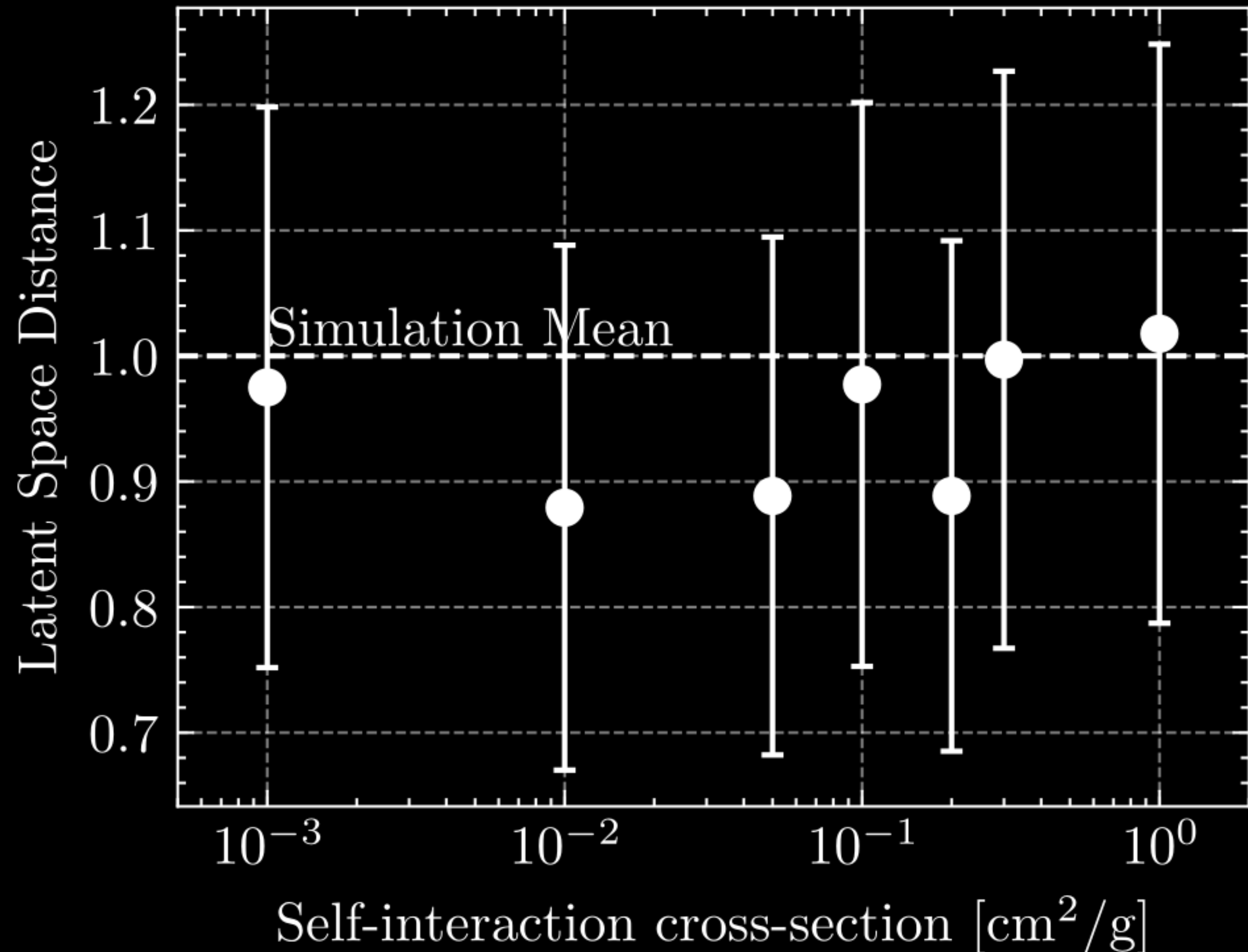


$$\sigma/m_{\text{DM}} = 0.55^{+0.35}_{-0.30} \text{cm}^2/\text{g}$$

INCONSISTENT WITH CDM AT $\sim 3\sigma$



512 DIMENSION LATENT SPACE OVERLAP SUGGESTS MODEL IS GOOD FIT TO THE DATA



Deep learning has enabled us to probe dark matter in a completely new way
- leading to strong evidence for scattered particles in massive cluster typical
of self-interacting dark matter.