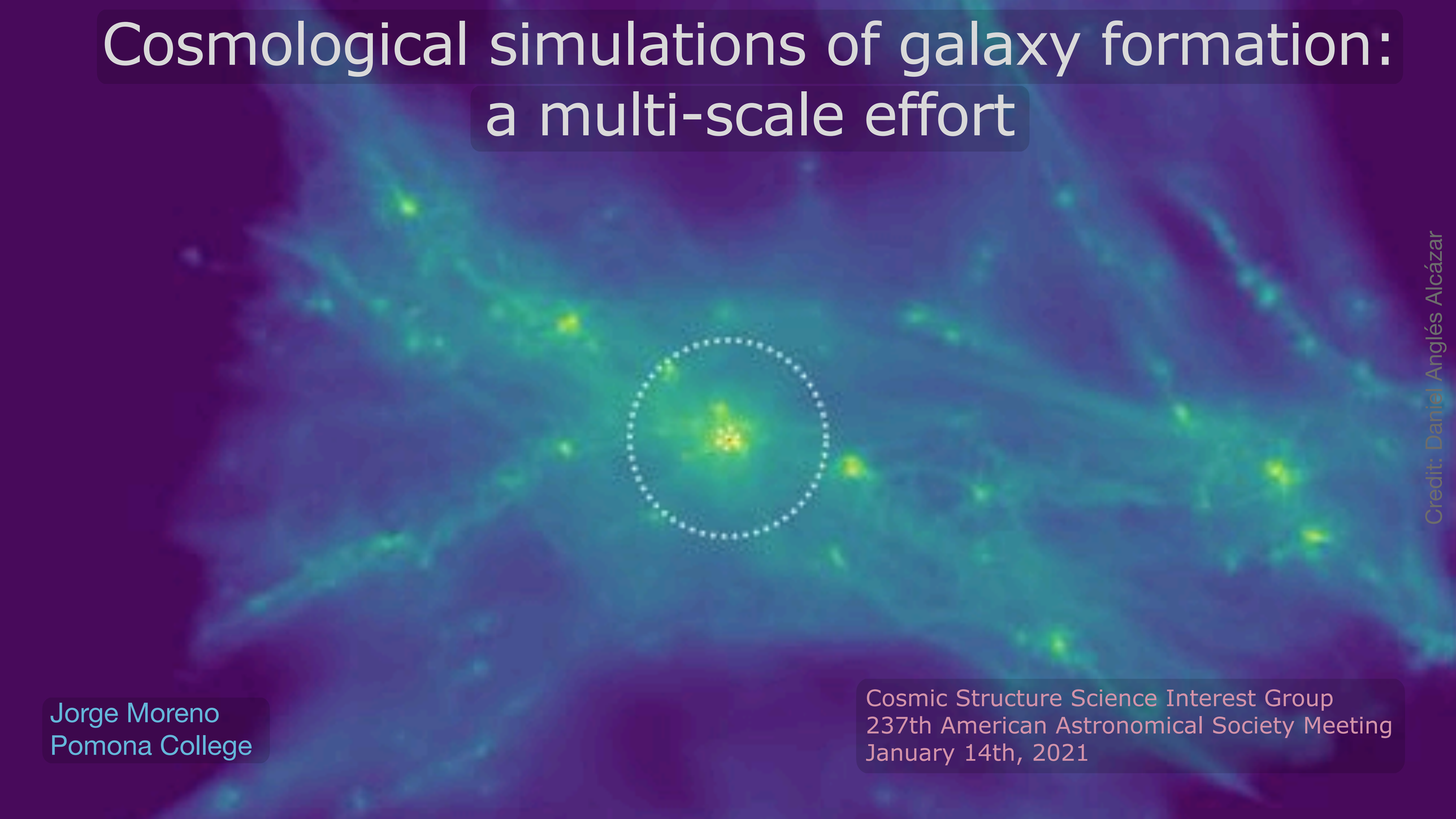
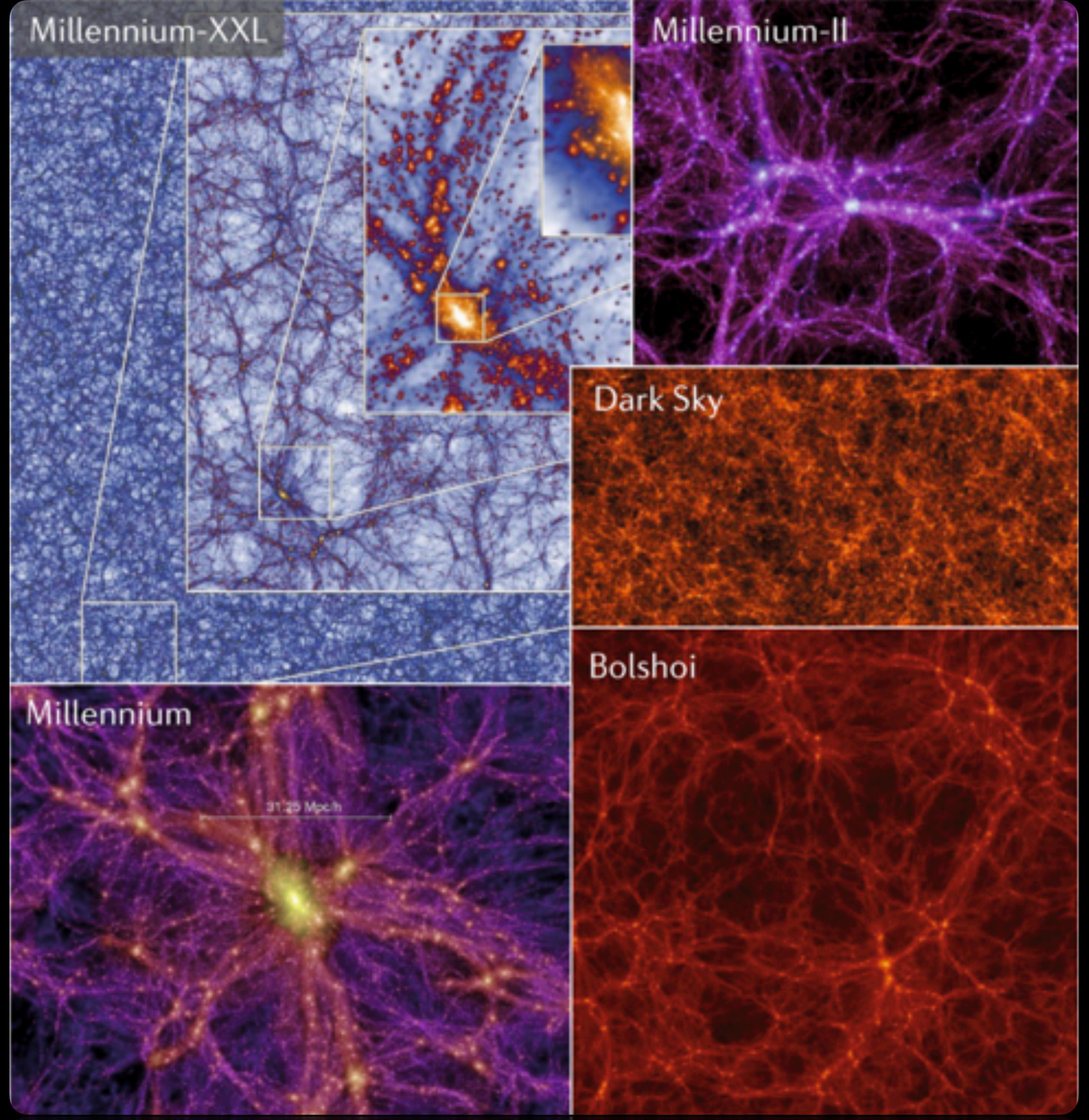
Cosmological simulations of galaxy formation: a multi-scale effort



Credit: Daniel Anglés Alcázar

Jorge Moreno
Pomona College

Cosmic Structure Science Interest Group
237th American Astronomical Society Meeting
January 14th, 2021



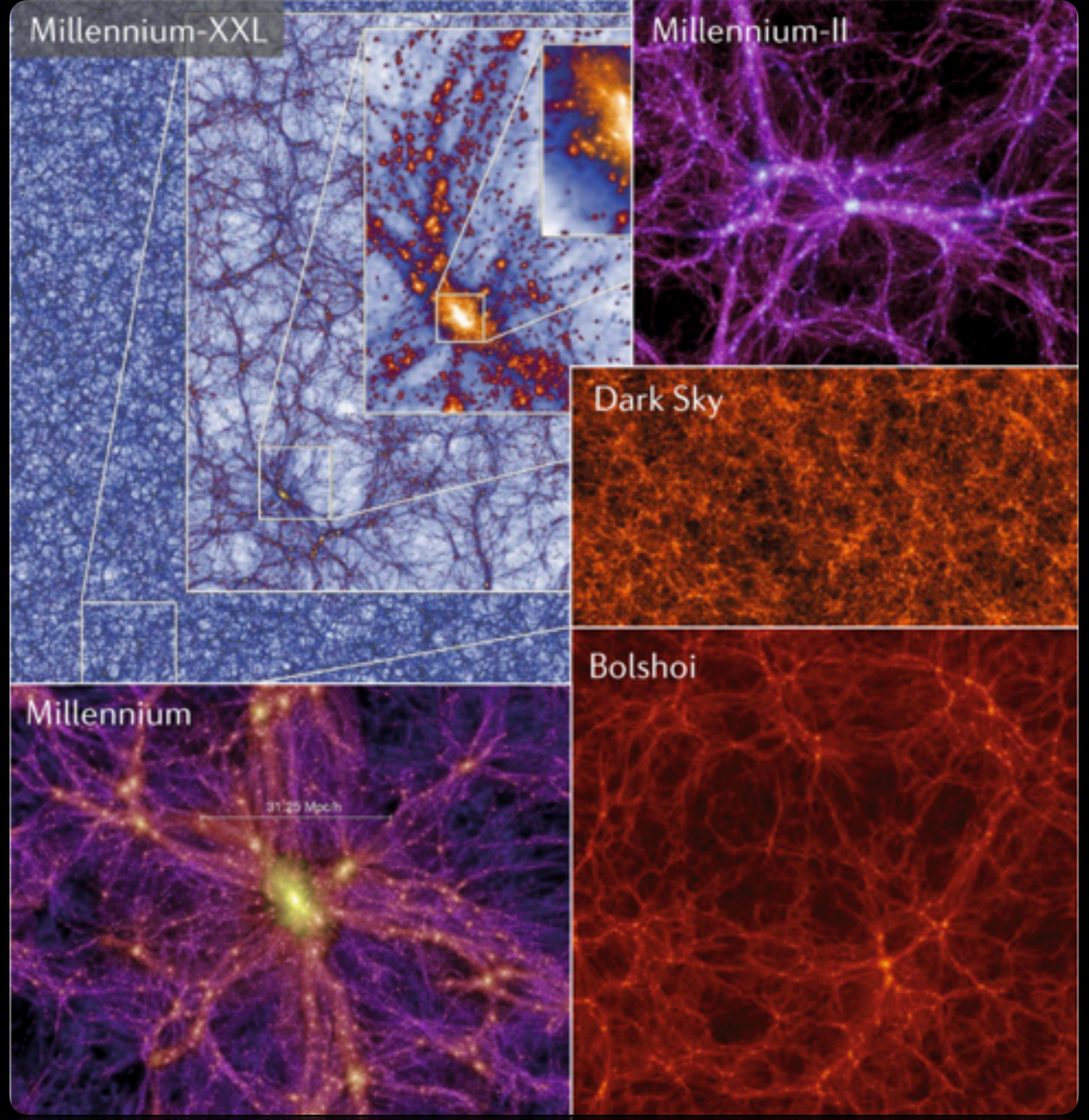
Credit: Mark Vogelsberger

Painting galaxies onto haloes

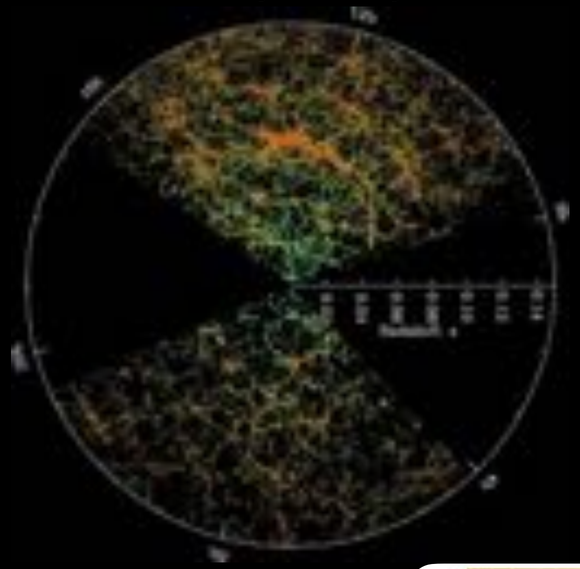
Halo occupation models
(abundance matching)

Semi-analytic
models

Credit: Mark Vogelsberger



Galaxy surveys



SDSS

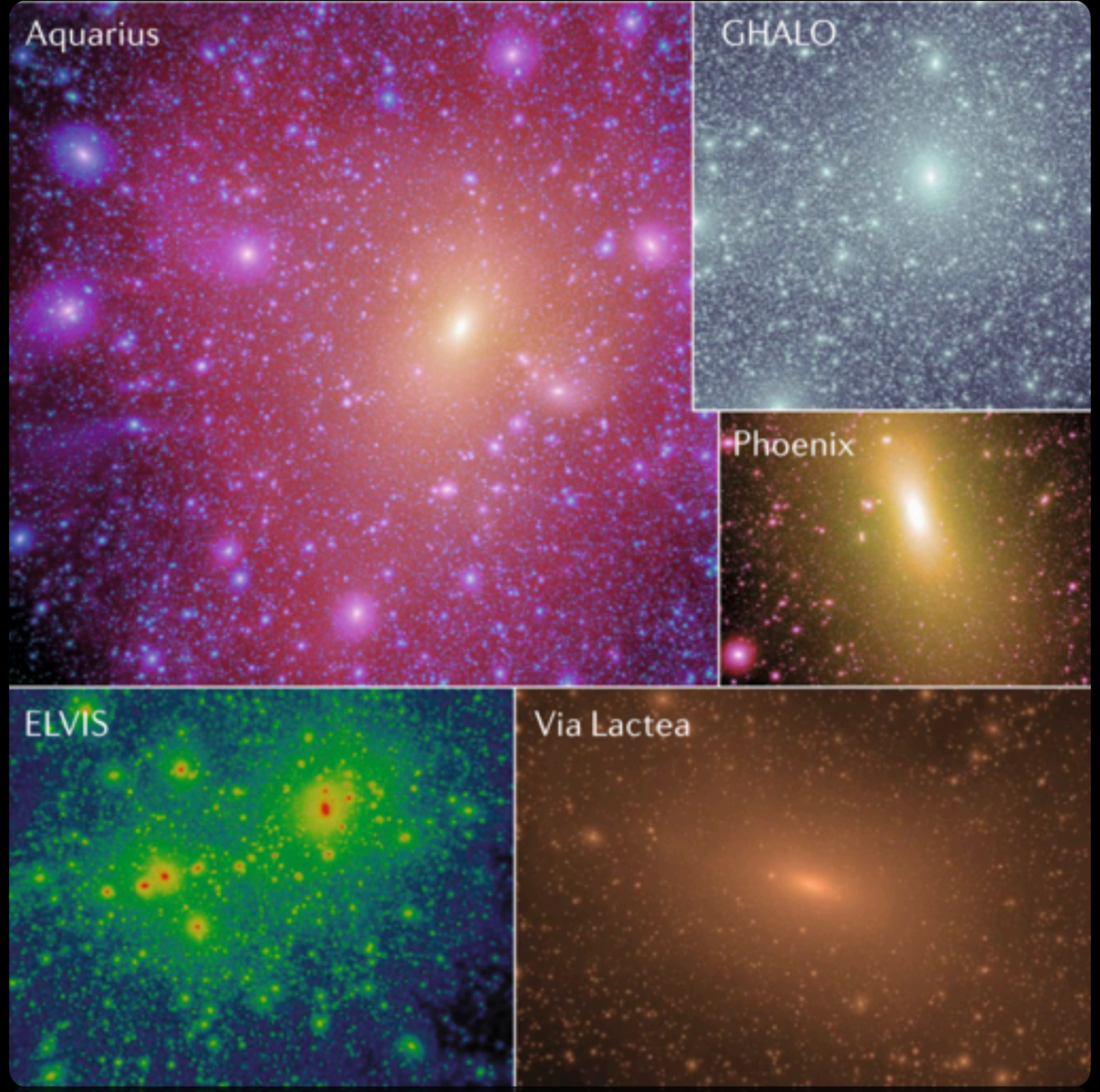
GAMA

CANDELS

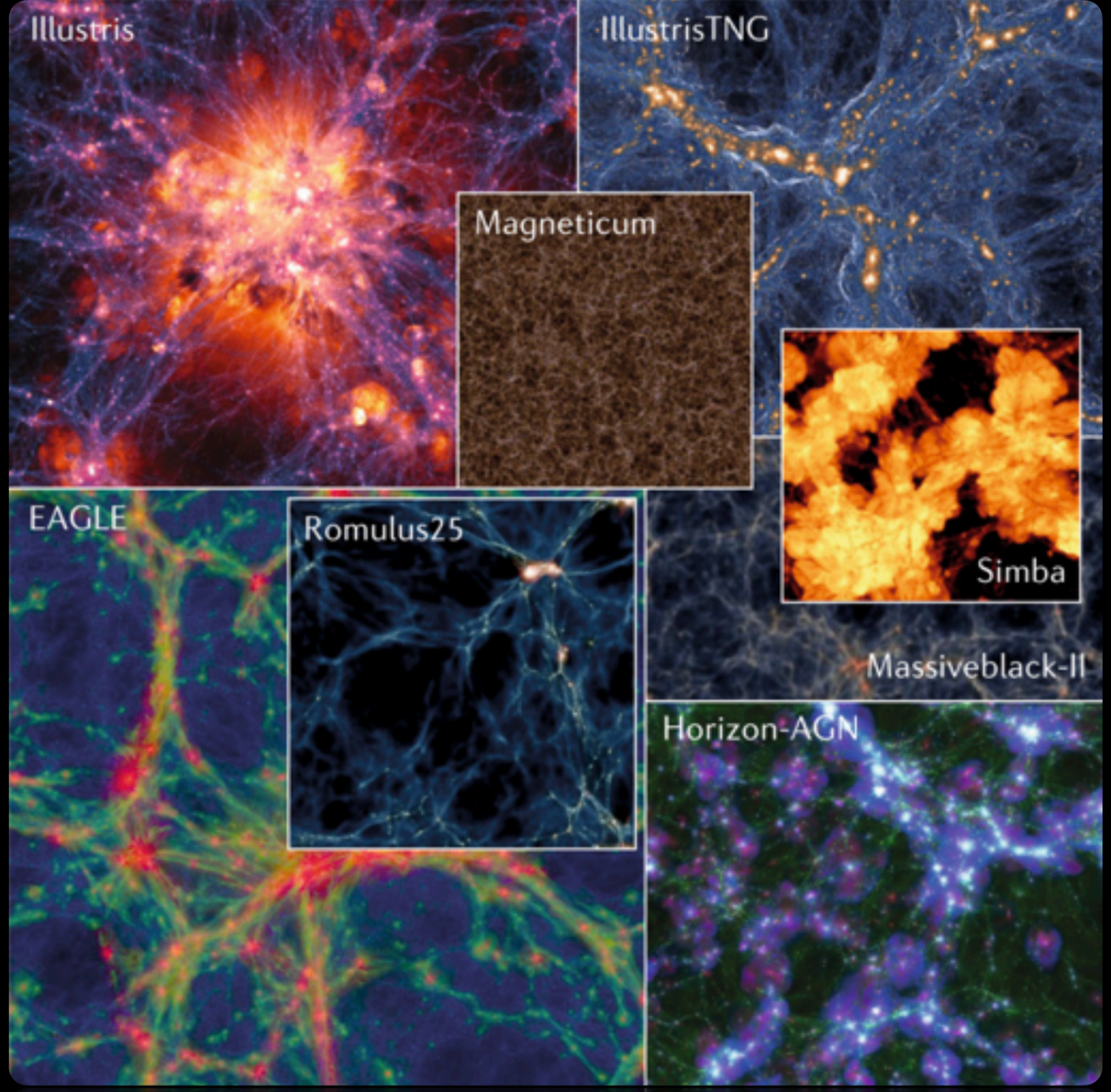
COSMOS

VIPERS

euclid



Credit: Mark Vogelsberger



Credit: Mark Vogelsberger

Integral field spectroscopic surveys

CALIFA Survey

SURVEY SAMI

MaNGA

SINS/zC-SINF AO Survey

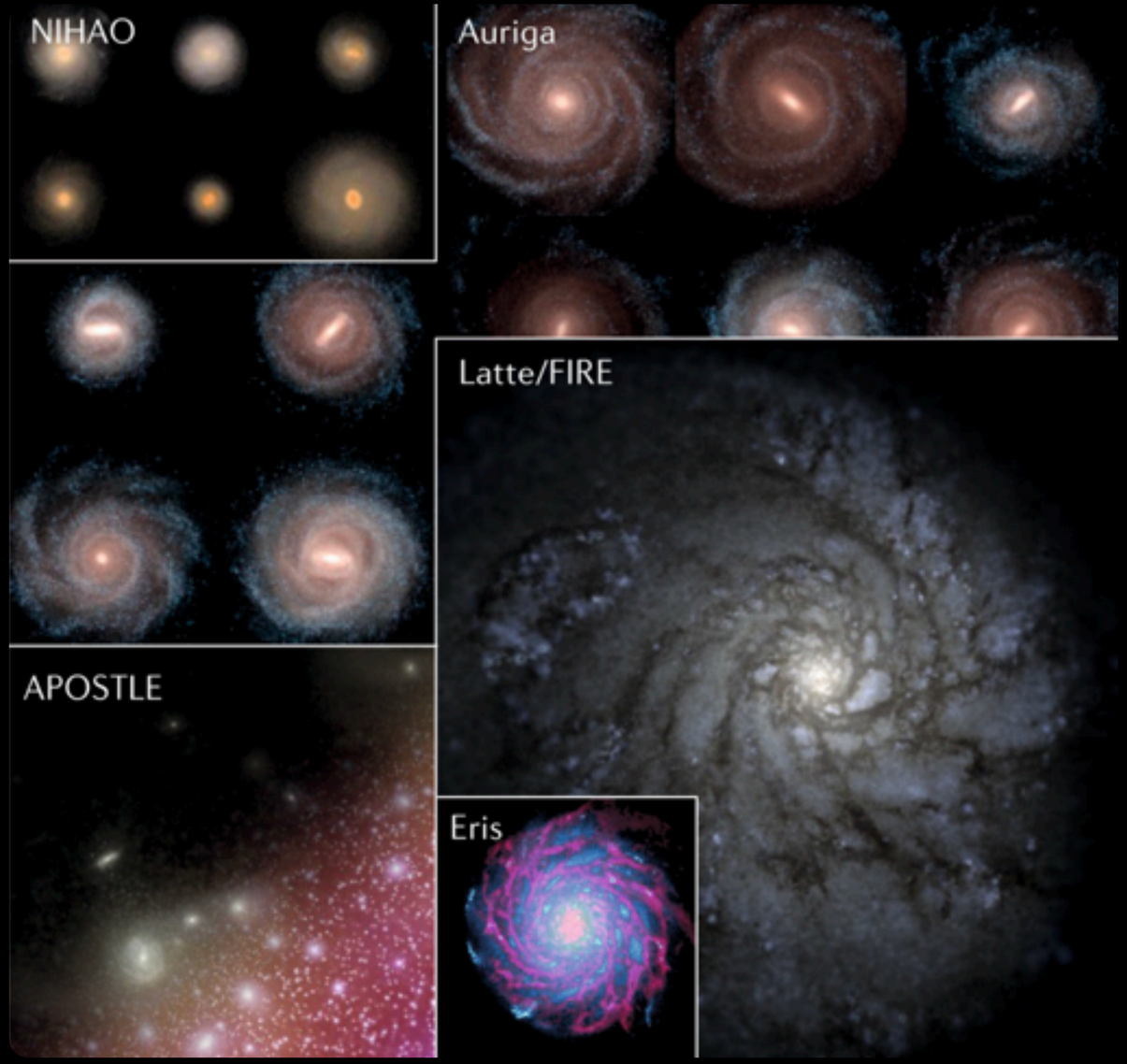
KMOS3D

PHANGS

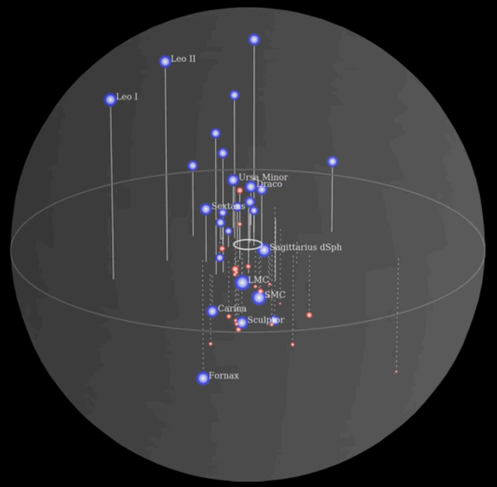
EDGE

ALMa QUEST

ALMA



Credit: Mark Vogelsberger



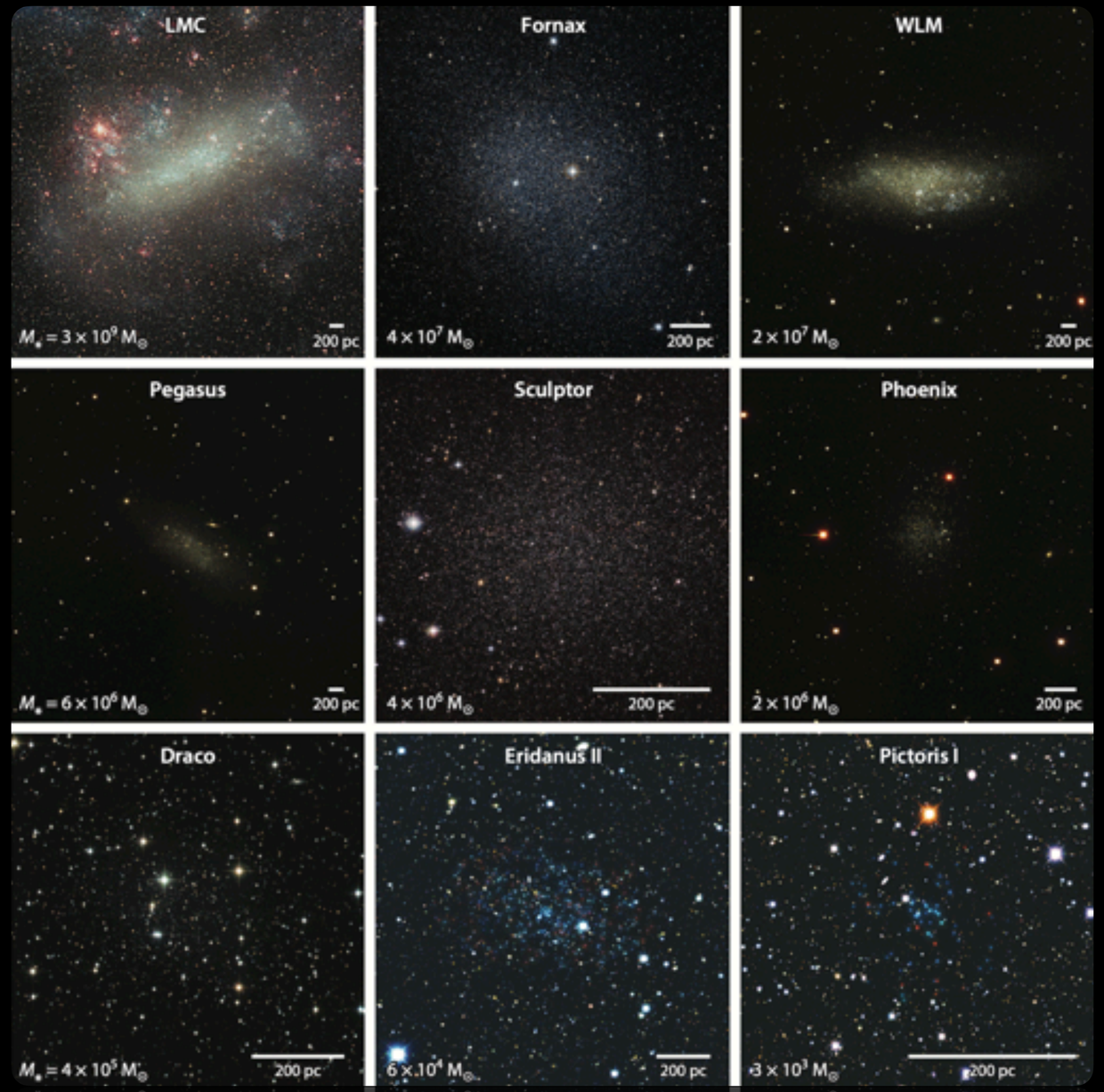
Cold dark matter versus Local Group galaxies

Alternatives to cold dark matter

Credit: Mike Boylan-Kolchin & James Bullock

Next: Near field cosmology

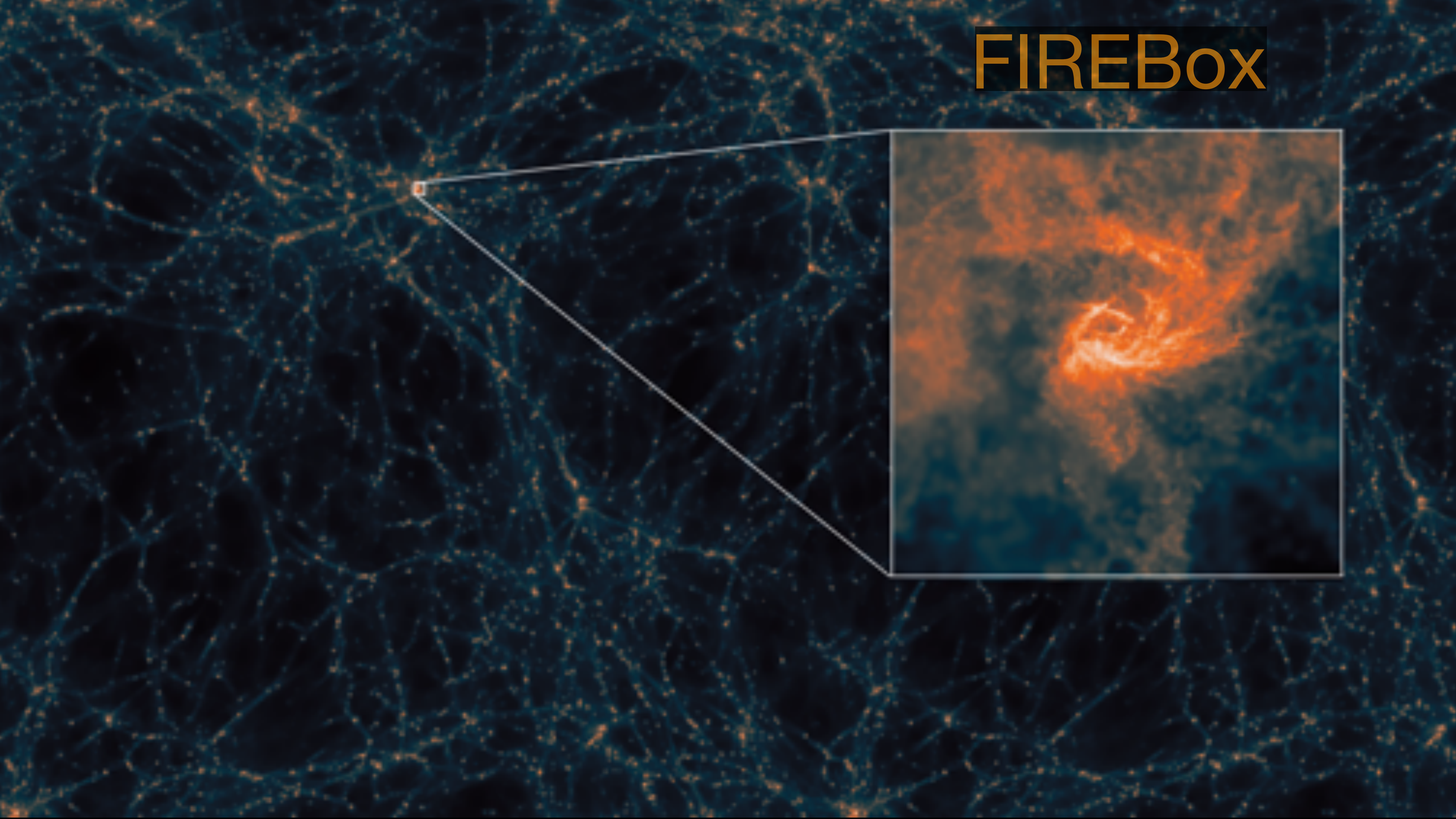
Credit: Mike Boylan-Kolchin & James Bullock



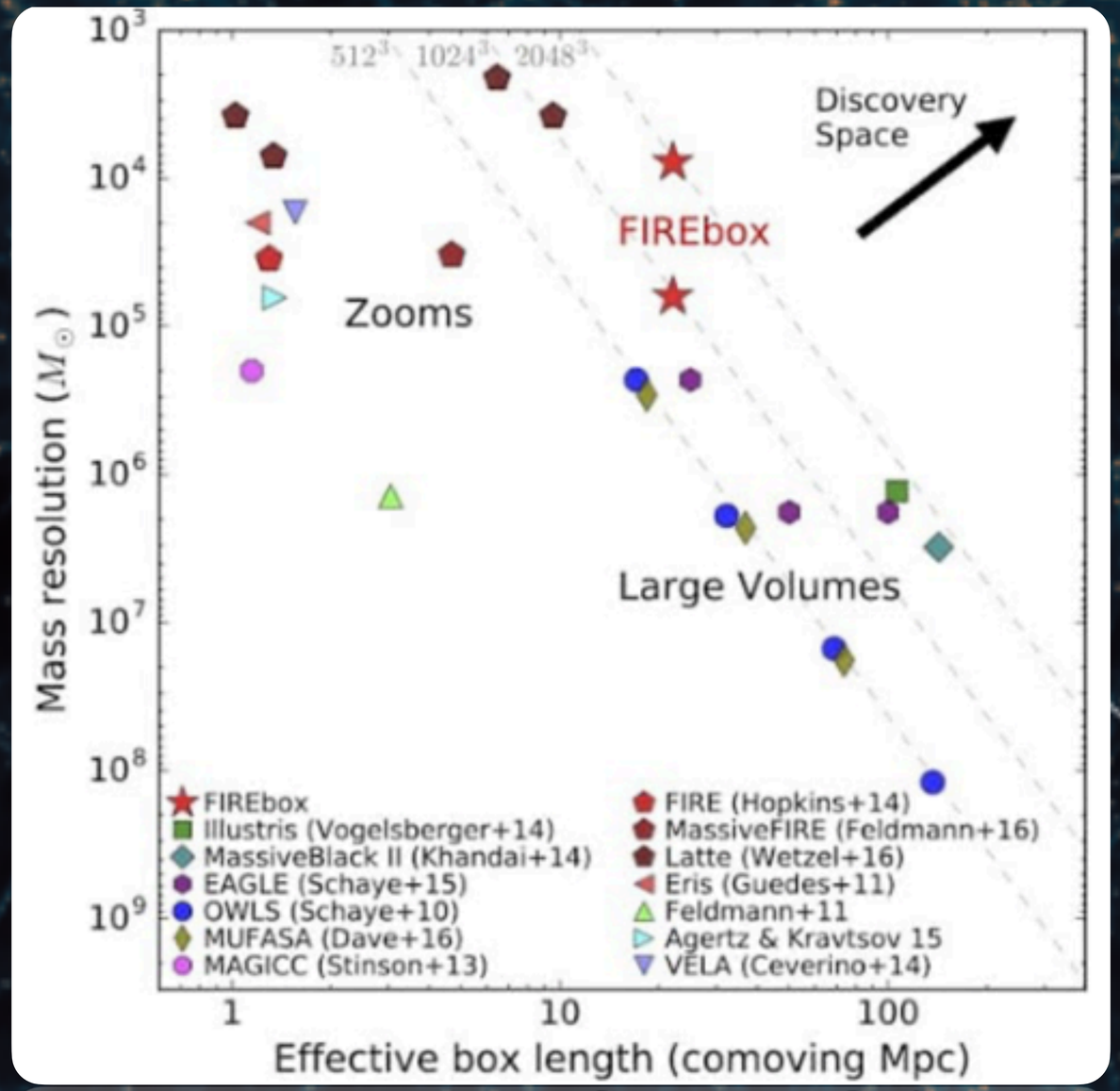
Challenges to the Lambda Cold Dark Matter model

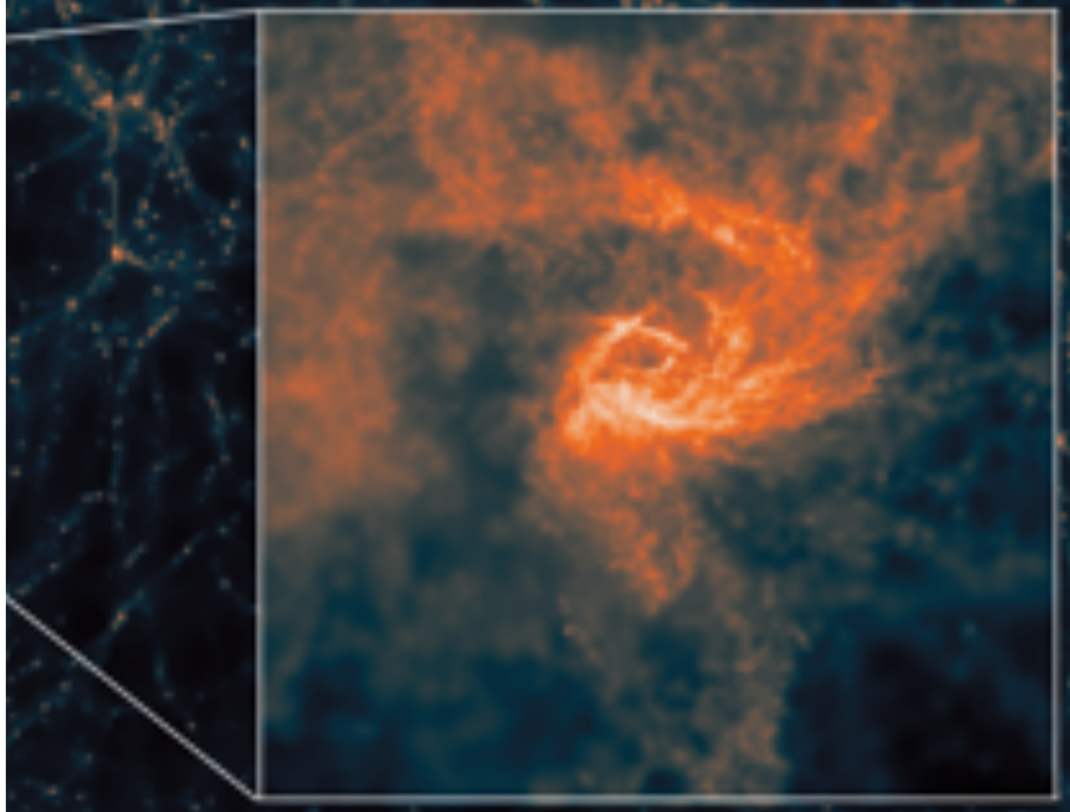
NGC 1052 DF2 (dark matter free galaxy)

S. Danieli, P. van dokkum (Dragonfly)

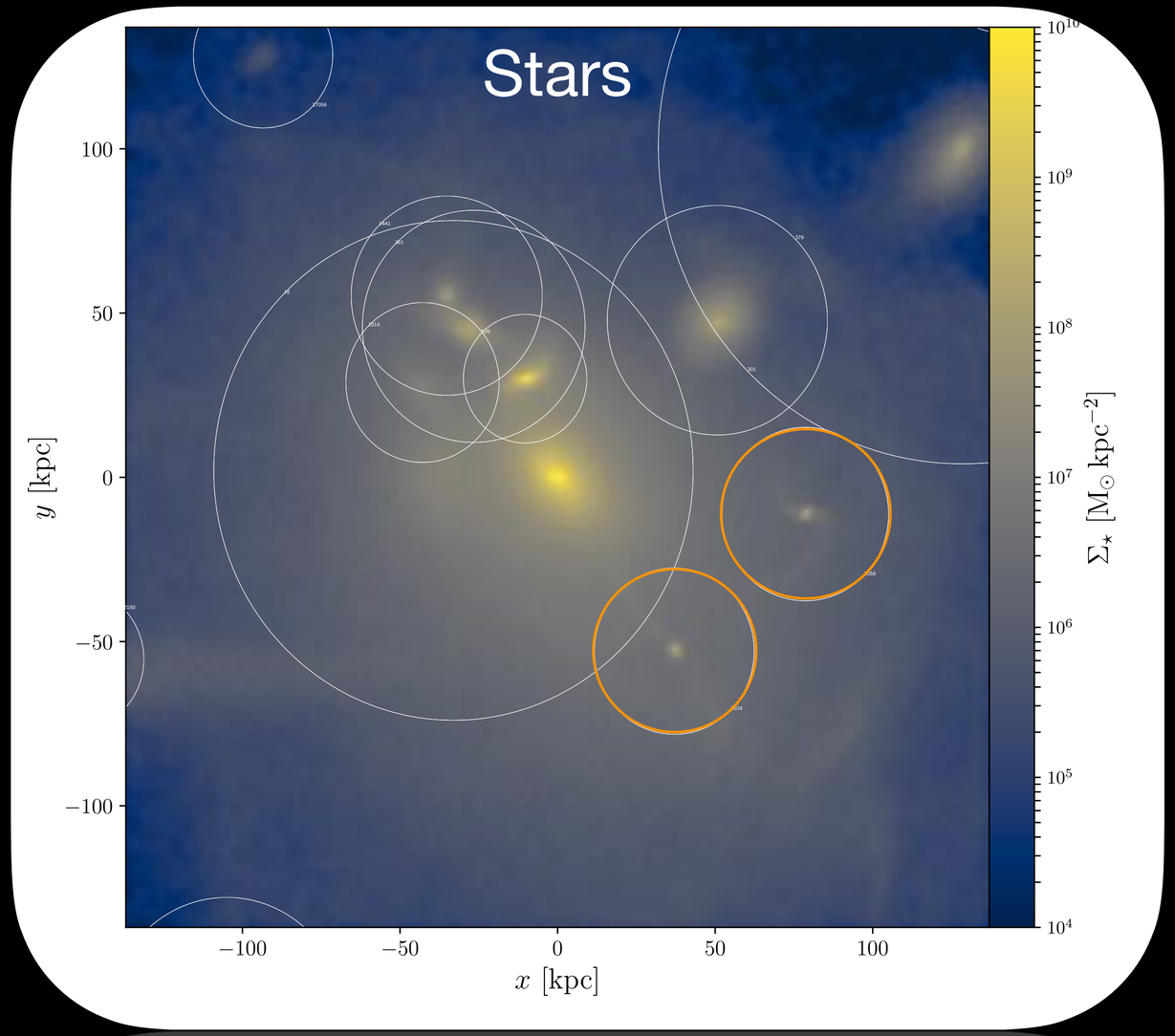

FIREBox

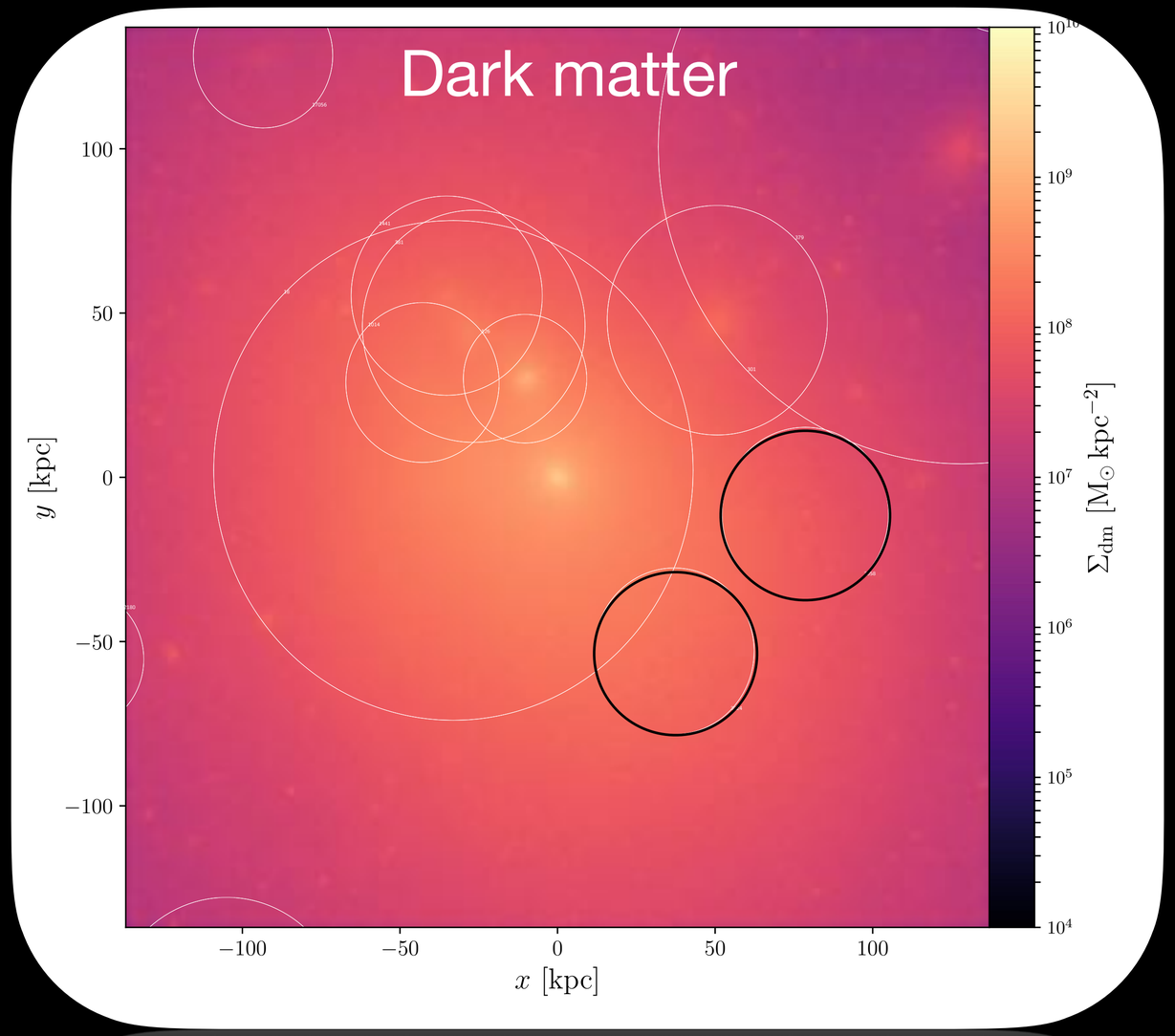
FIREBox





Credit: Robert Feldmann & the FIRE Collaboration



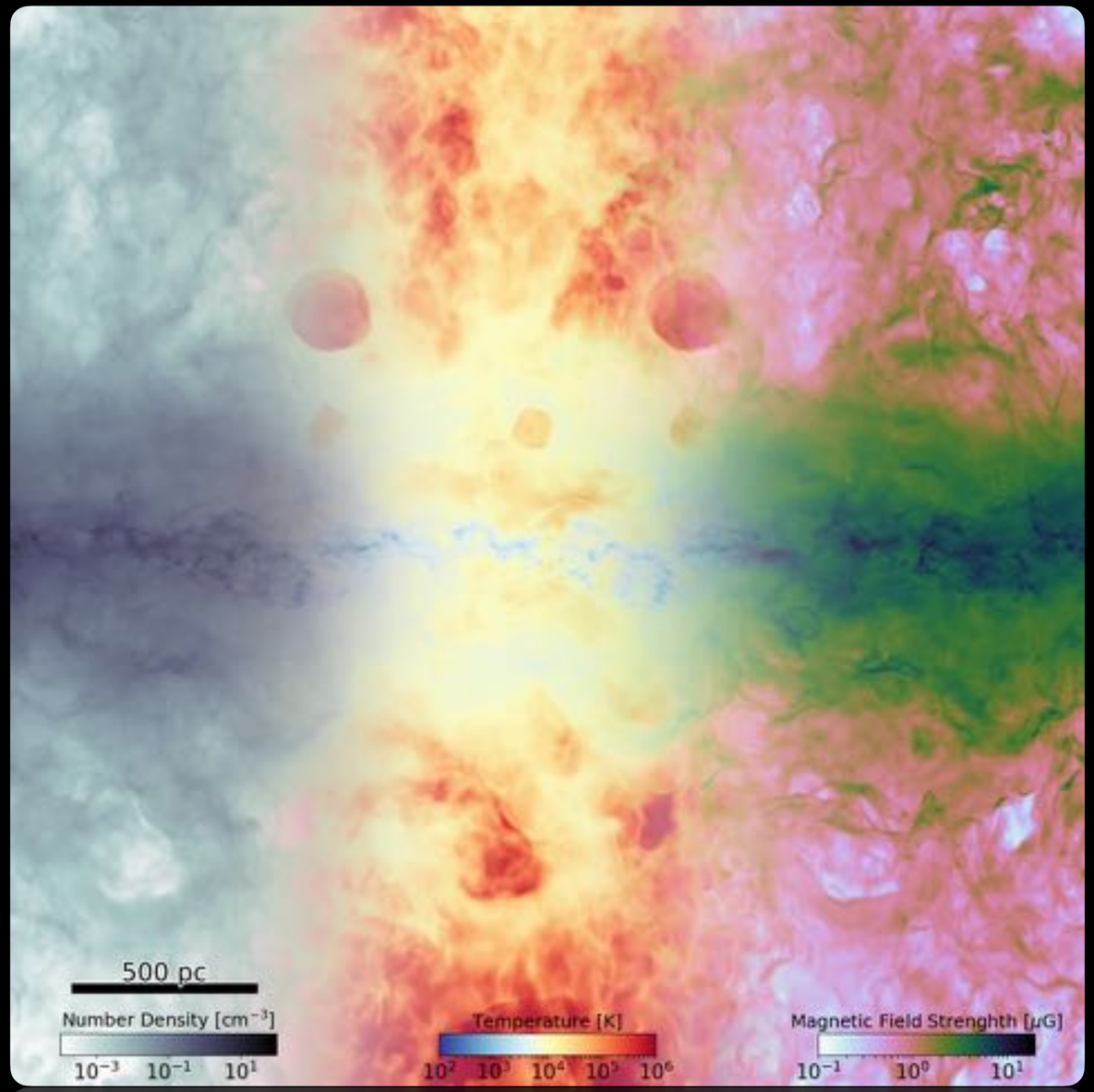


Dark matter free galaxies in FIREBox (with LCDM)

Moreno et al. (in prep)

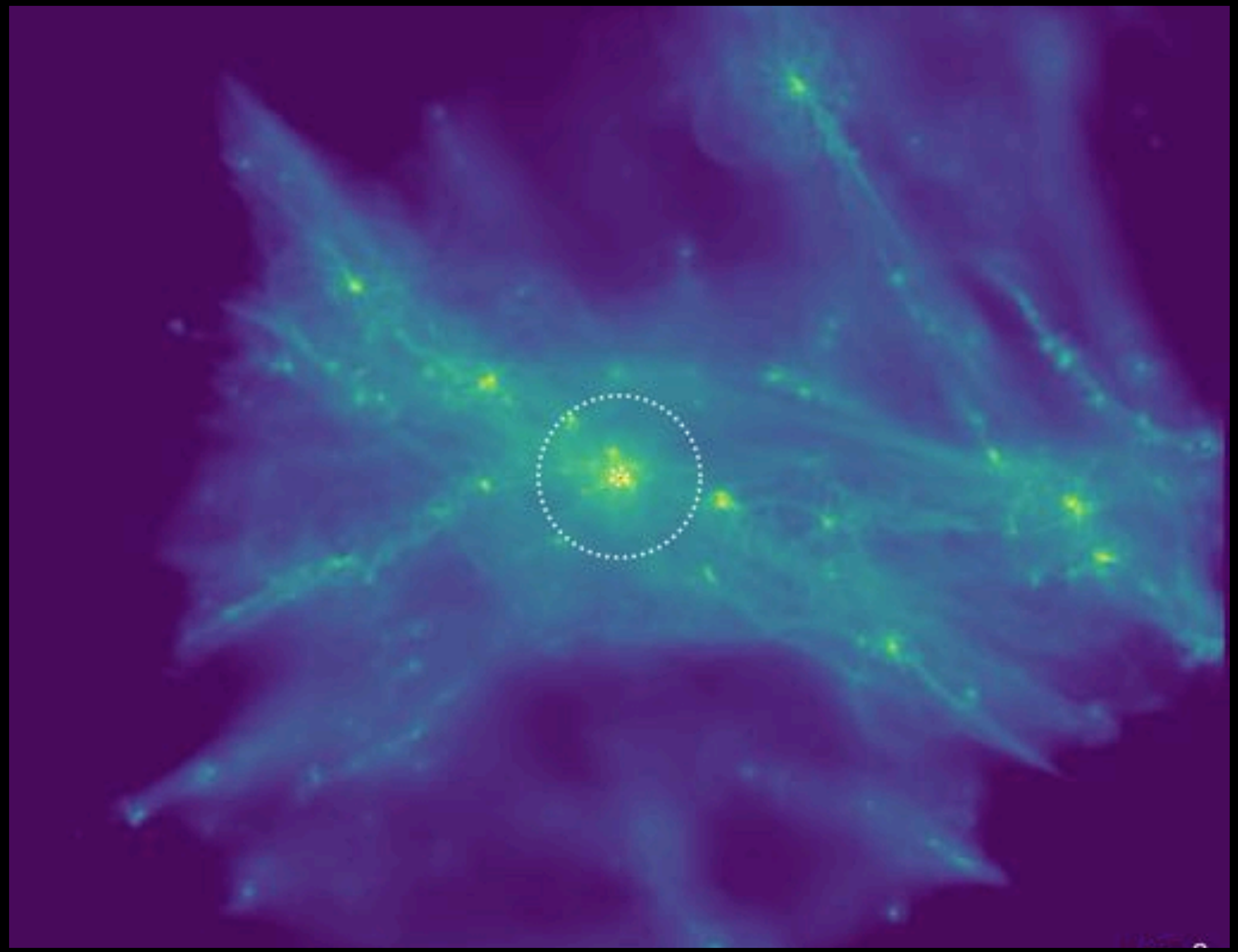
Next: ISM-CGM

Credit: SMAUG Collaboration



Next: AGN Accretion & Feedback

Credit: Daniel Anglés Alcázar



Thank you!