Galaxy formation essentials

Estallidos Workshop - Granada, 11-13 May 2015

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Why simulations?

SIMULATIONS FOLLOW the EVOLUTION in TIME

SIMULATIONS INCLUDE the EFFECT of BARYONS on the TOTAL MATTER DISTRIBUTION

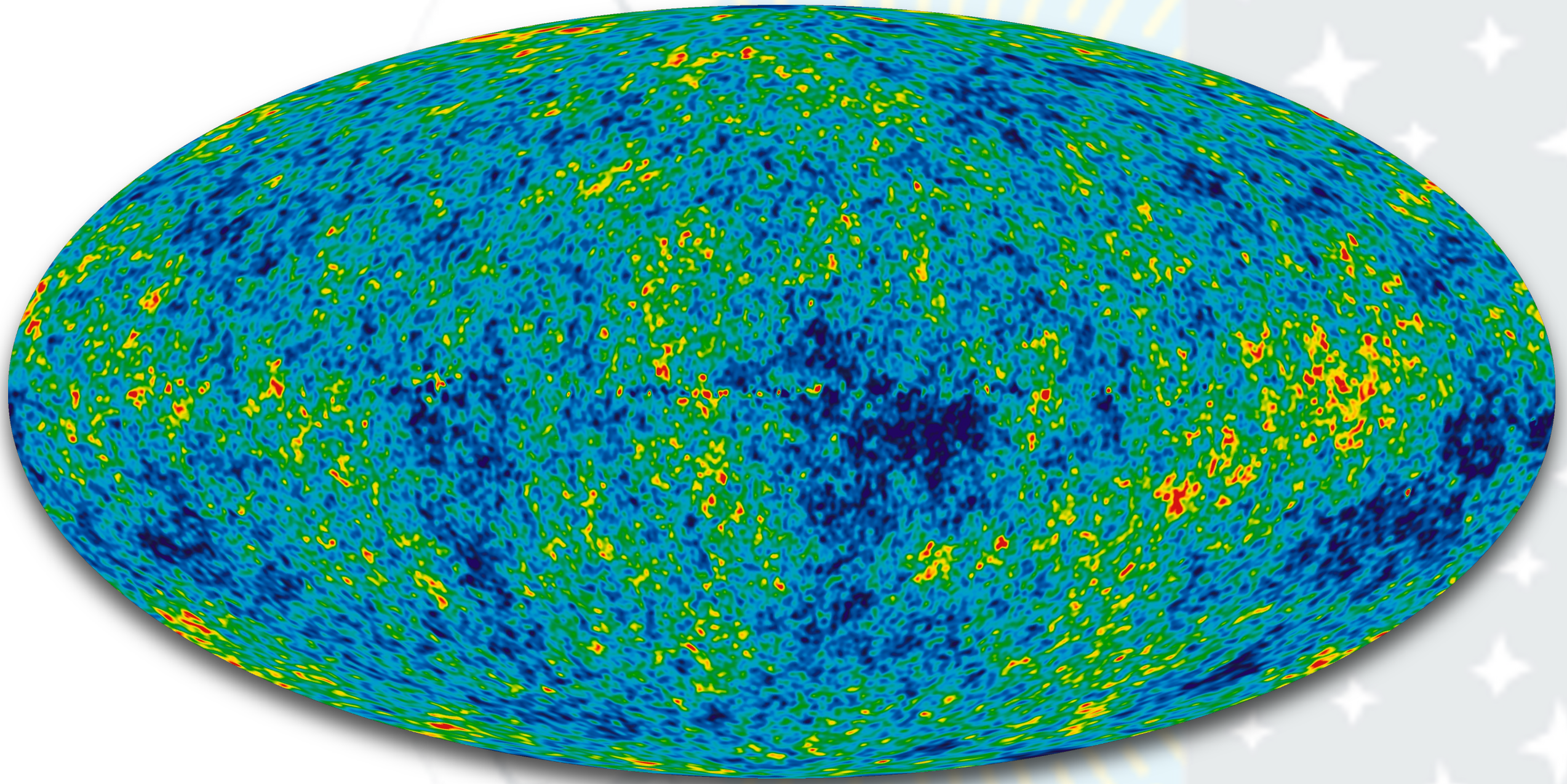
SIMULATIONS DIRECTLY MODEL the INTERPLAY of SEVERAL PHYSICAL PROCESSES

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Initial conditions

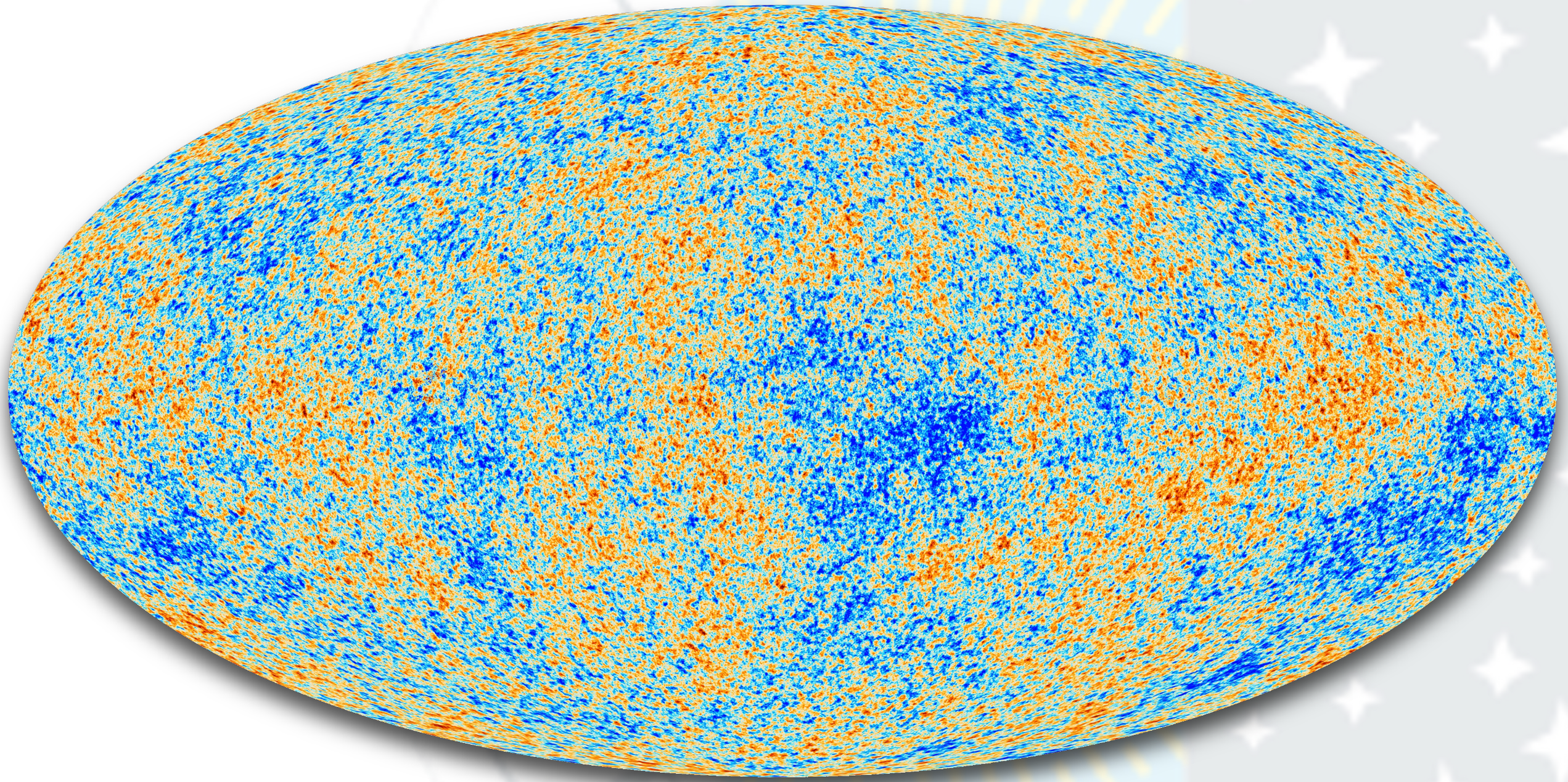
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Initial conditions



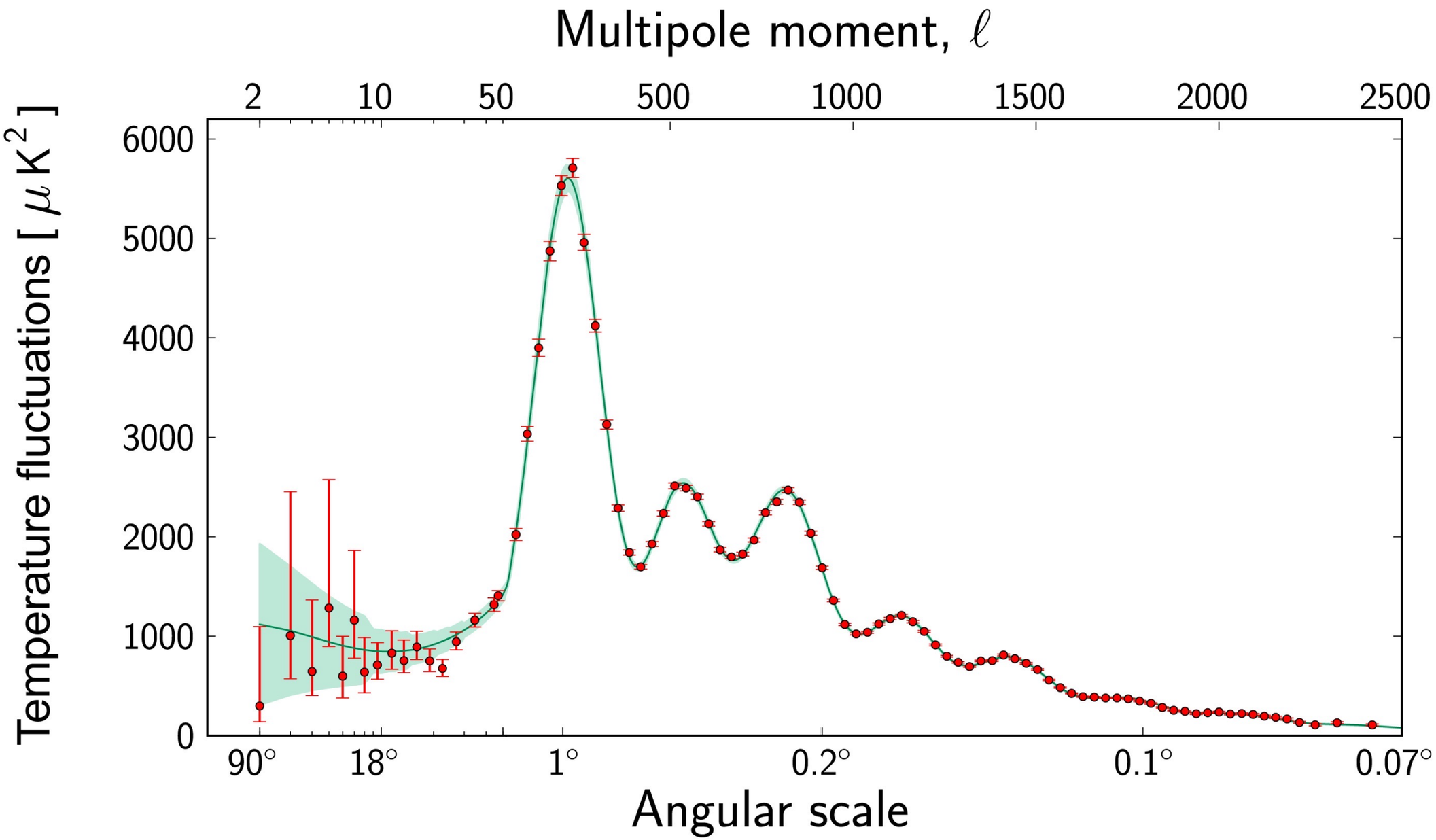
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Initial conditions



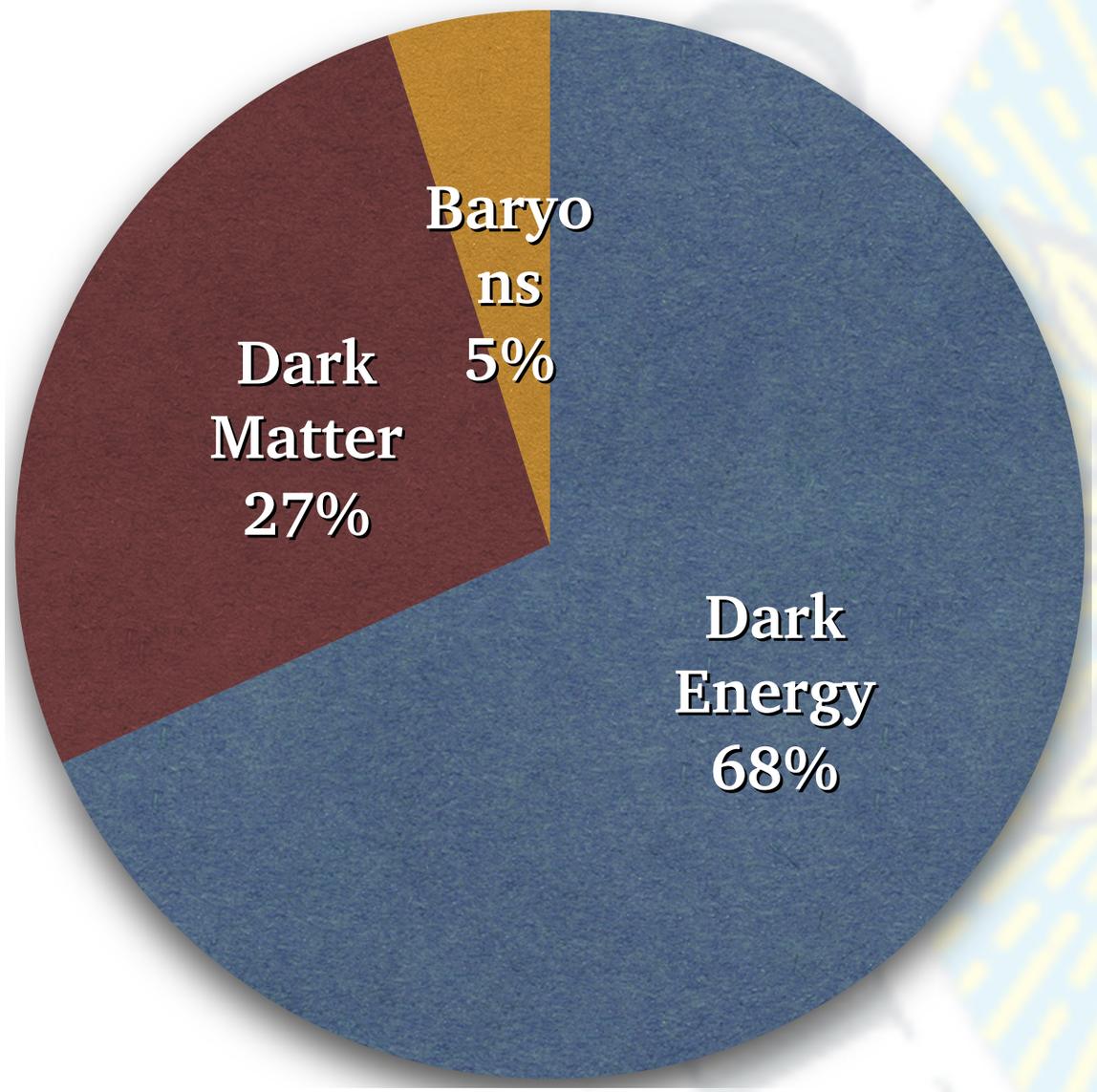
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Initial conditions



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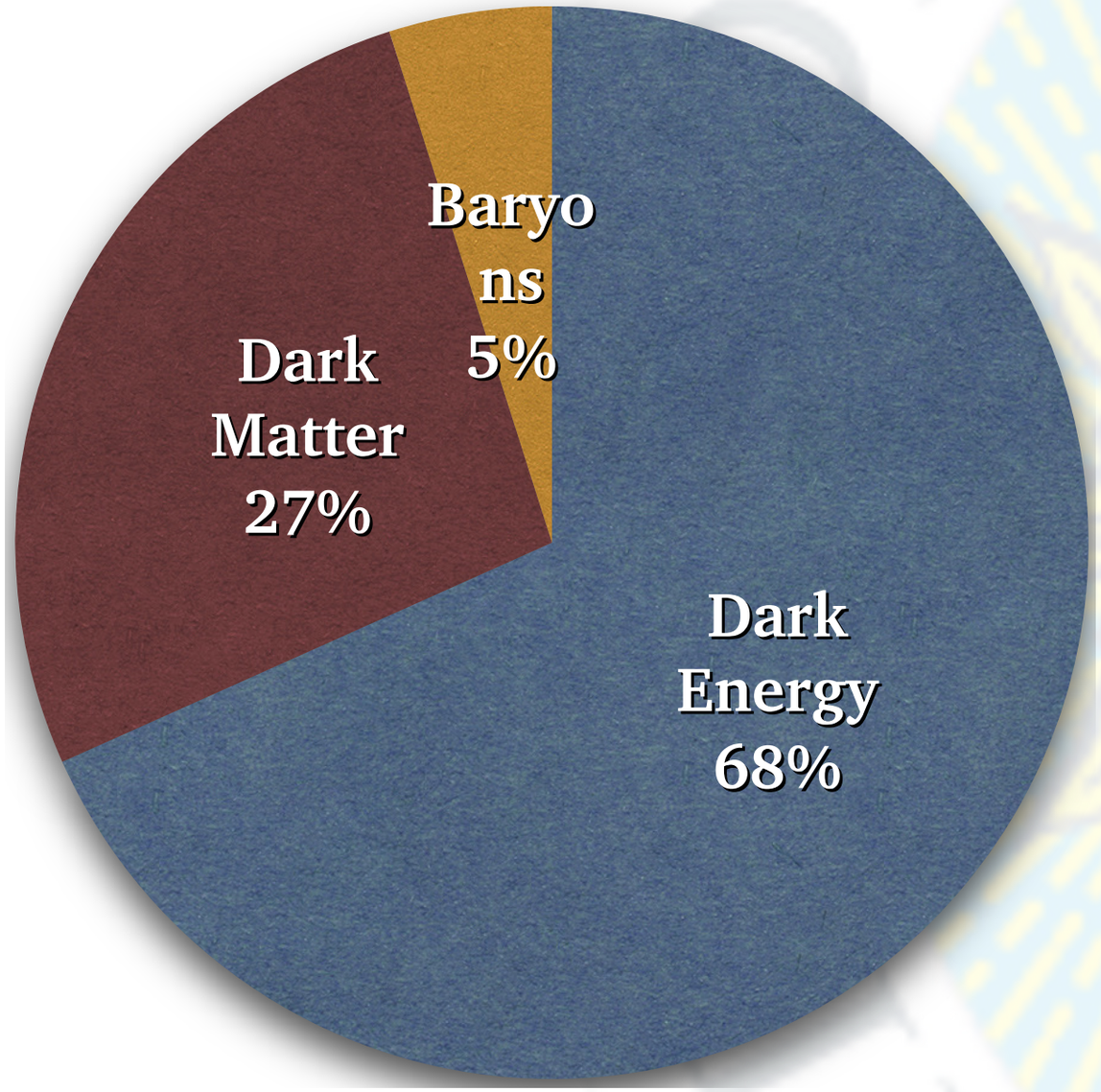
Content of the universe today

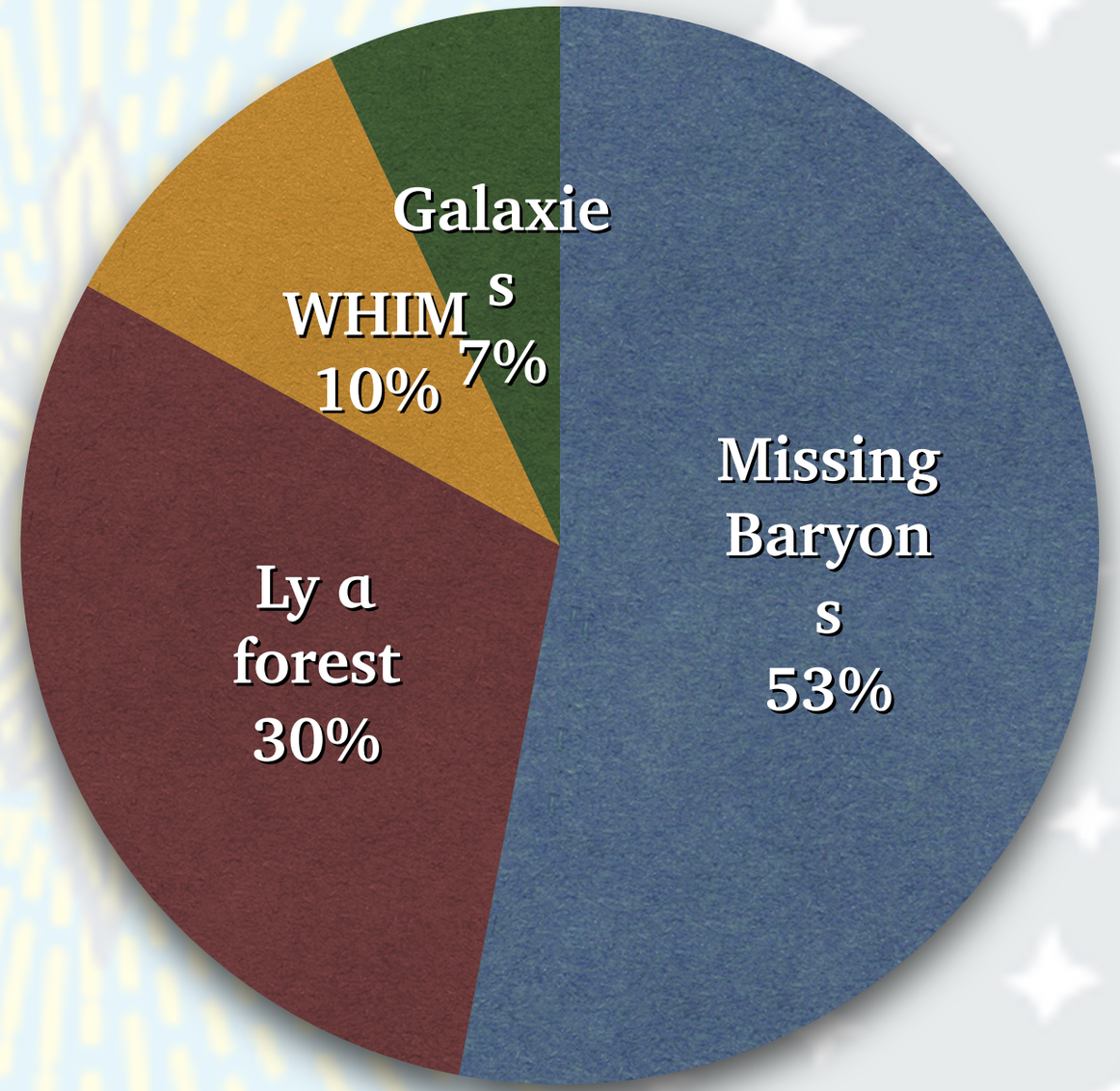


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Where are the baryons?

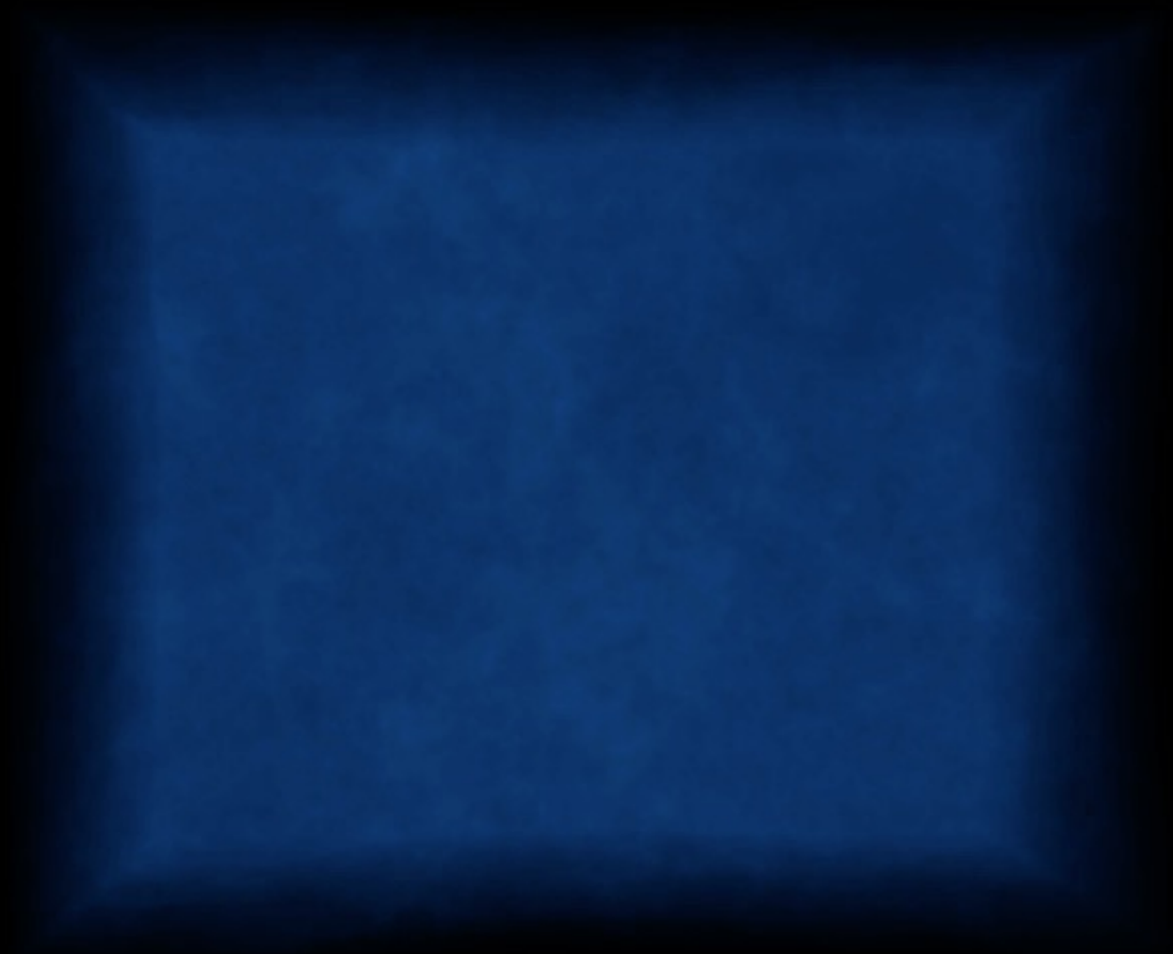




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Gravity

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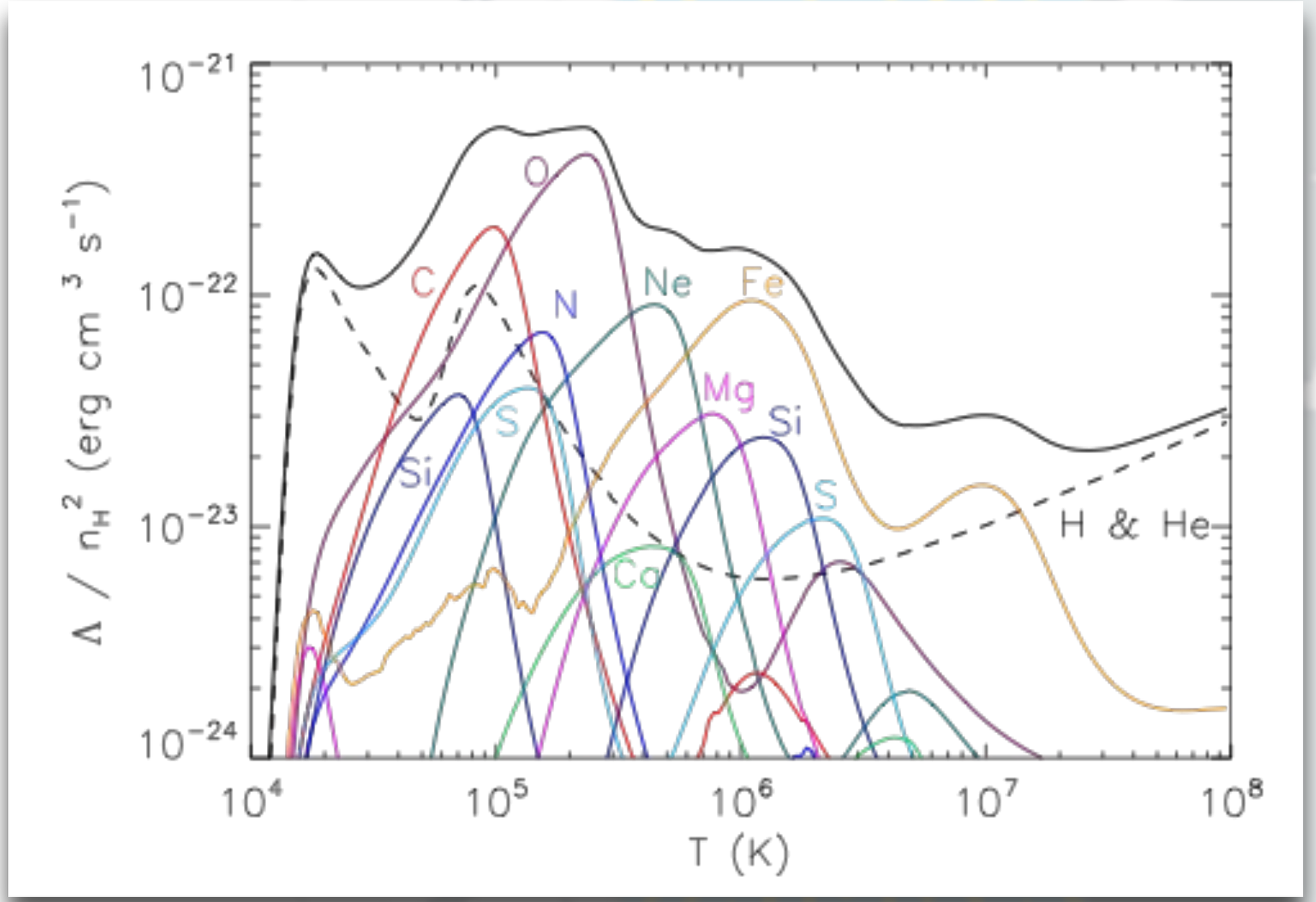


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Cooling

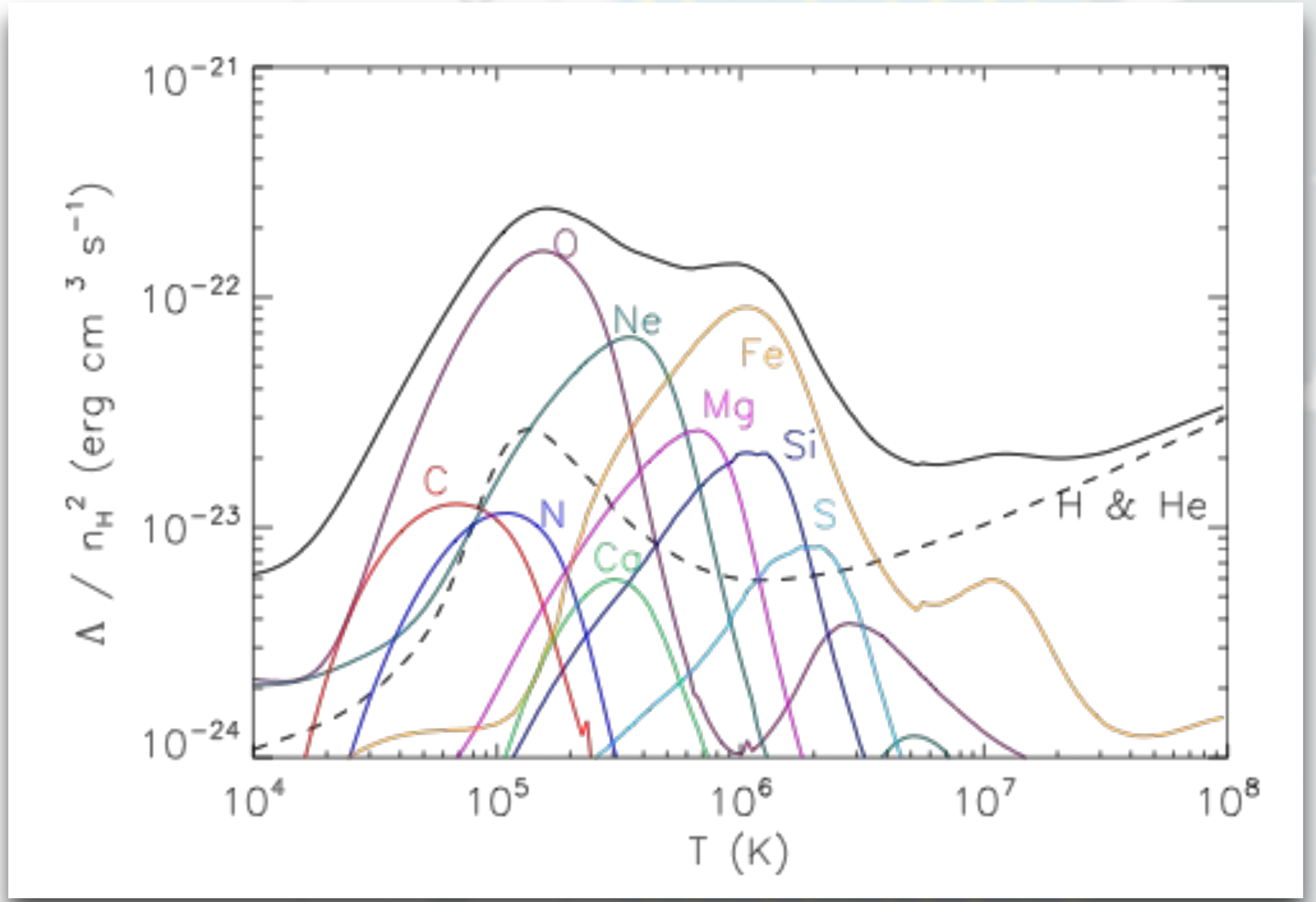
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Cooling



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Cooling

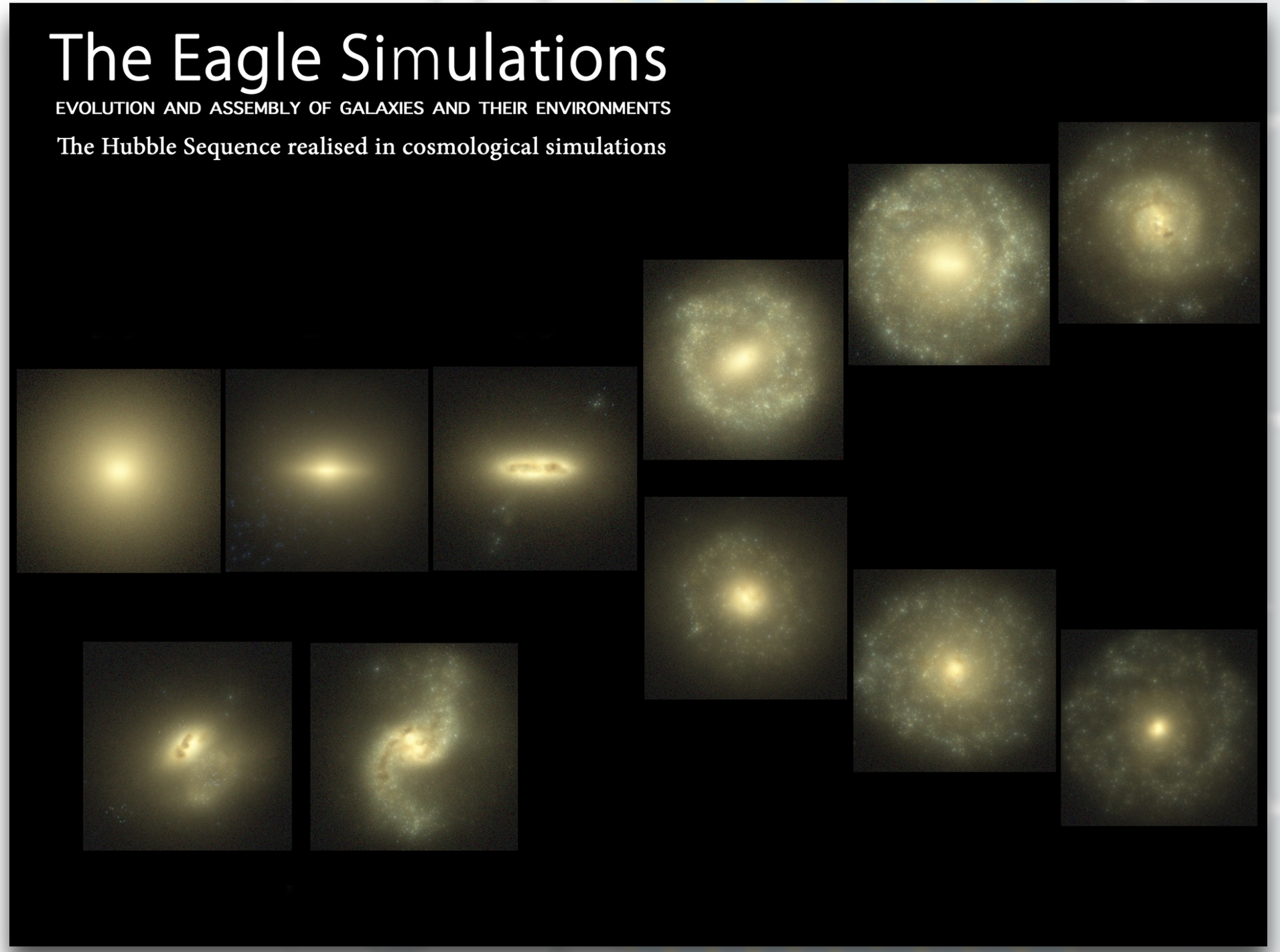


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Star formation

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Star formation



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Feedback

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Feedback

STELLAR EVOLUTION ⟶ RE-IONISATION of the UNIVERSE
(ionising photons)

STELLAR EVOLUTION ⟶ PRODUCTION and EJECTION of METALS
(AGB winds, SN explosions)

STELLAR EVOLUTION ⟶ THERMAL and MECHANICAL ENERGY
(SN explosions, radiation pressure massive stars)

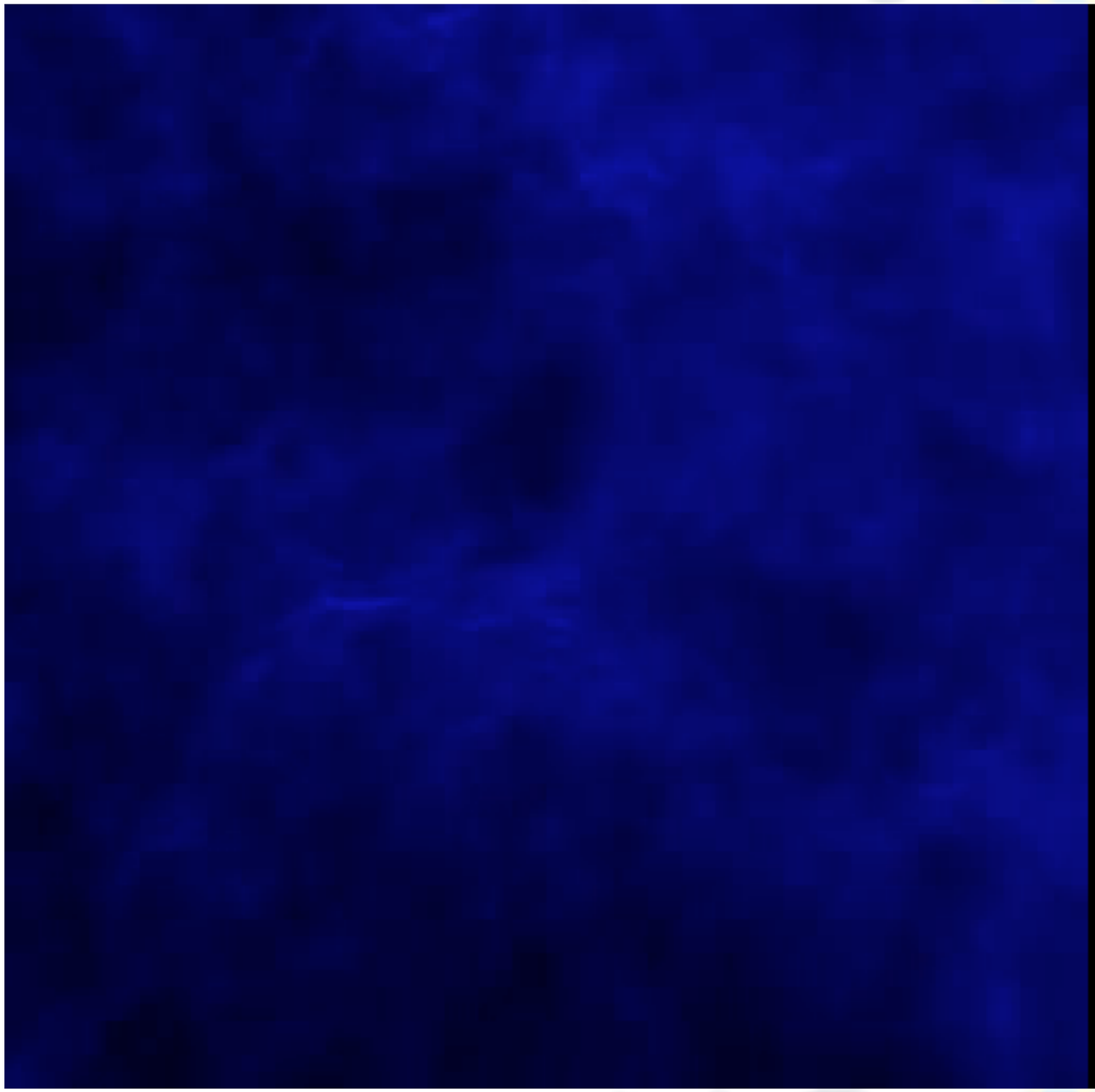
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Galactic winds

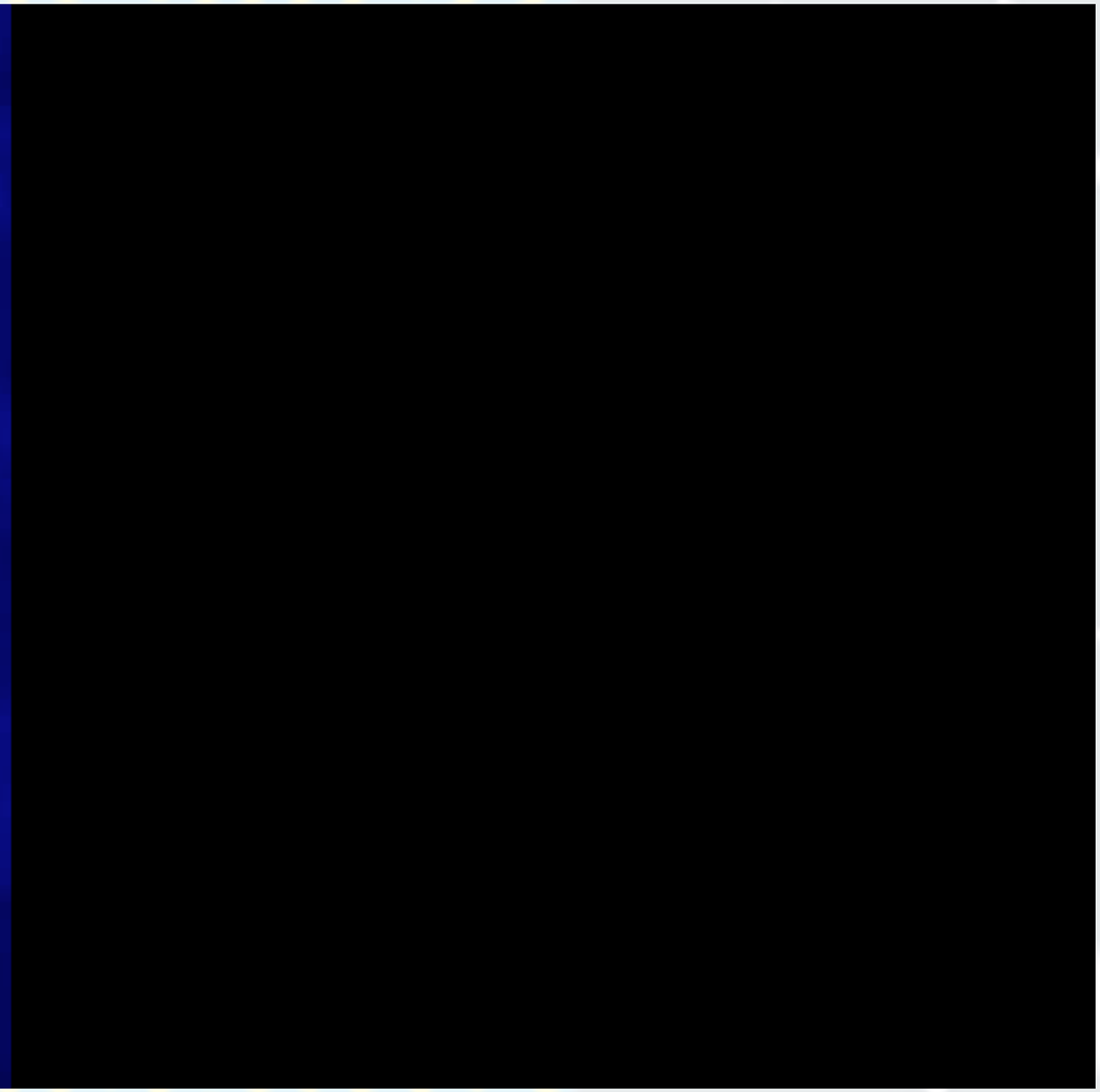


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The
First
Billion
Years
Simulation



gas density (colour code: temperature)

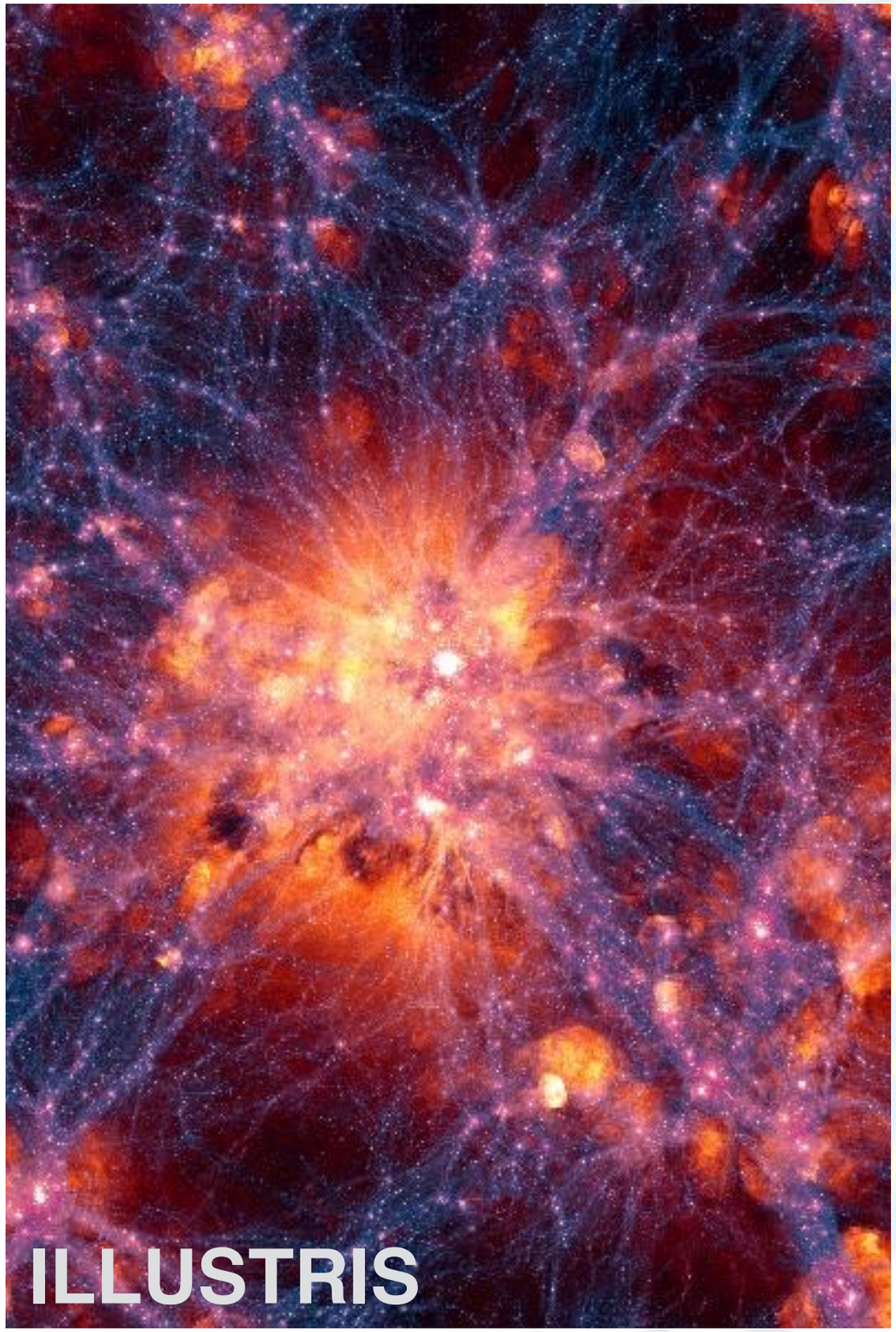


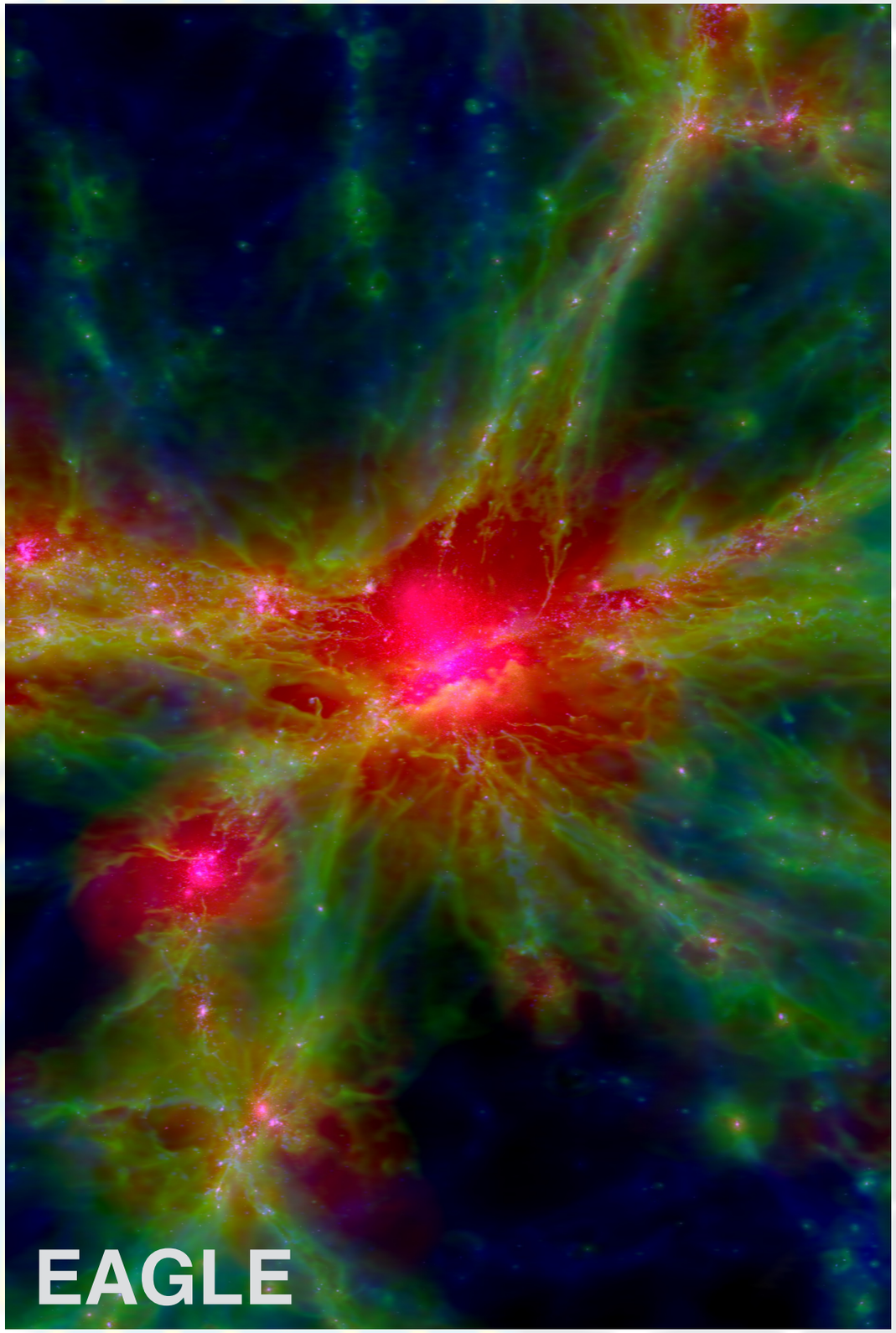
metal mass density

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State-of-the-art

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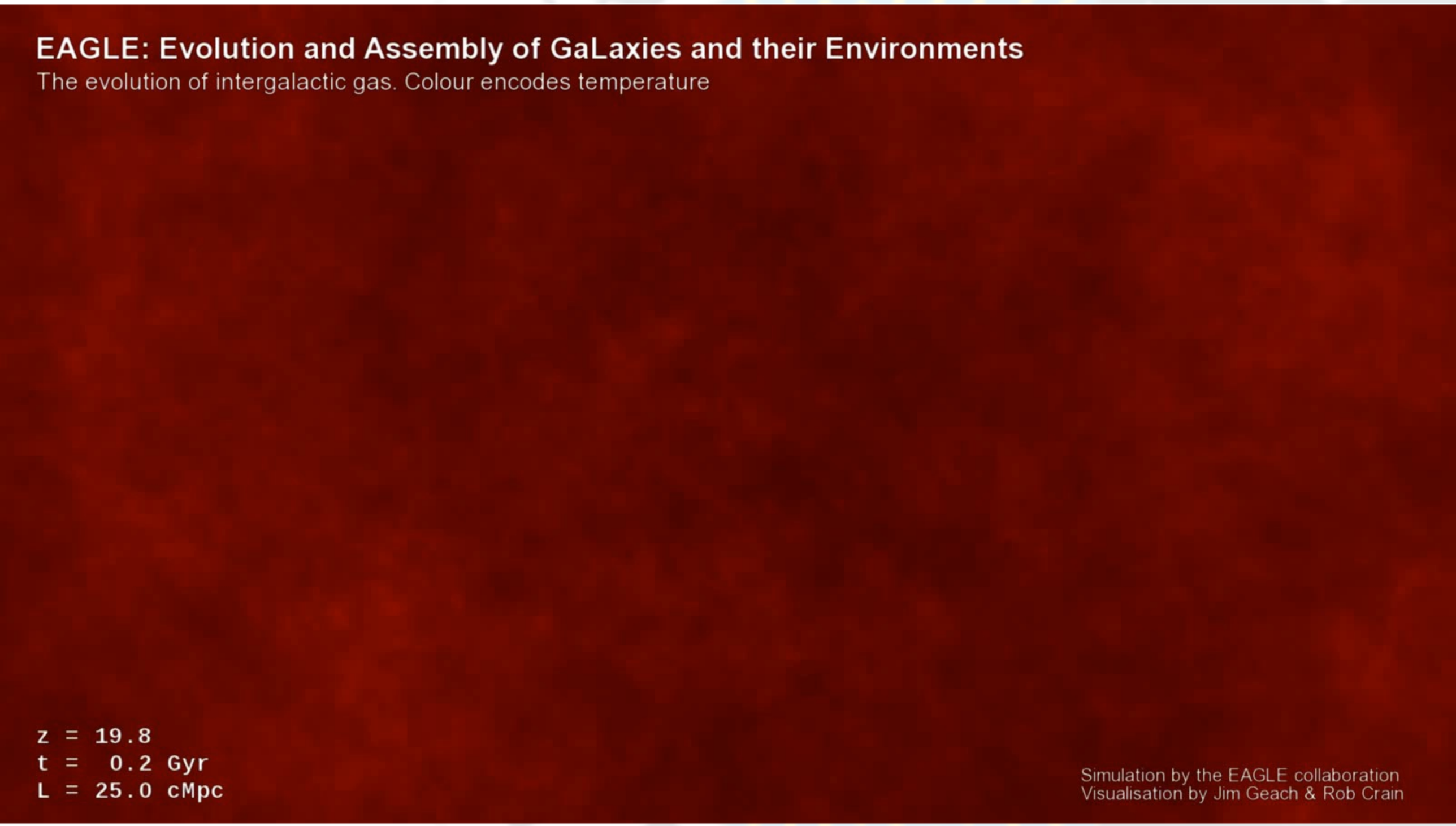




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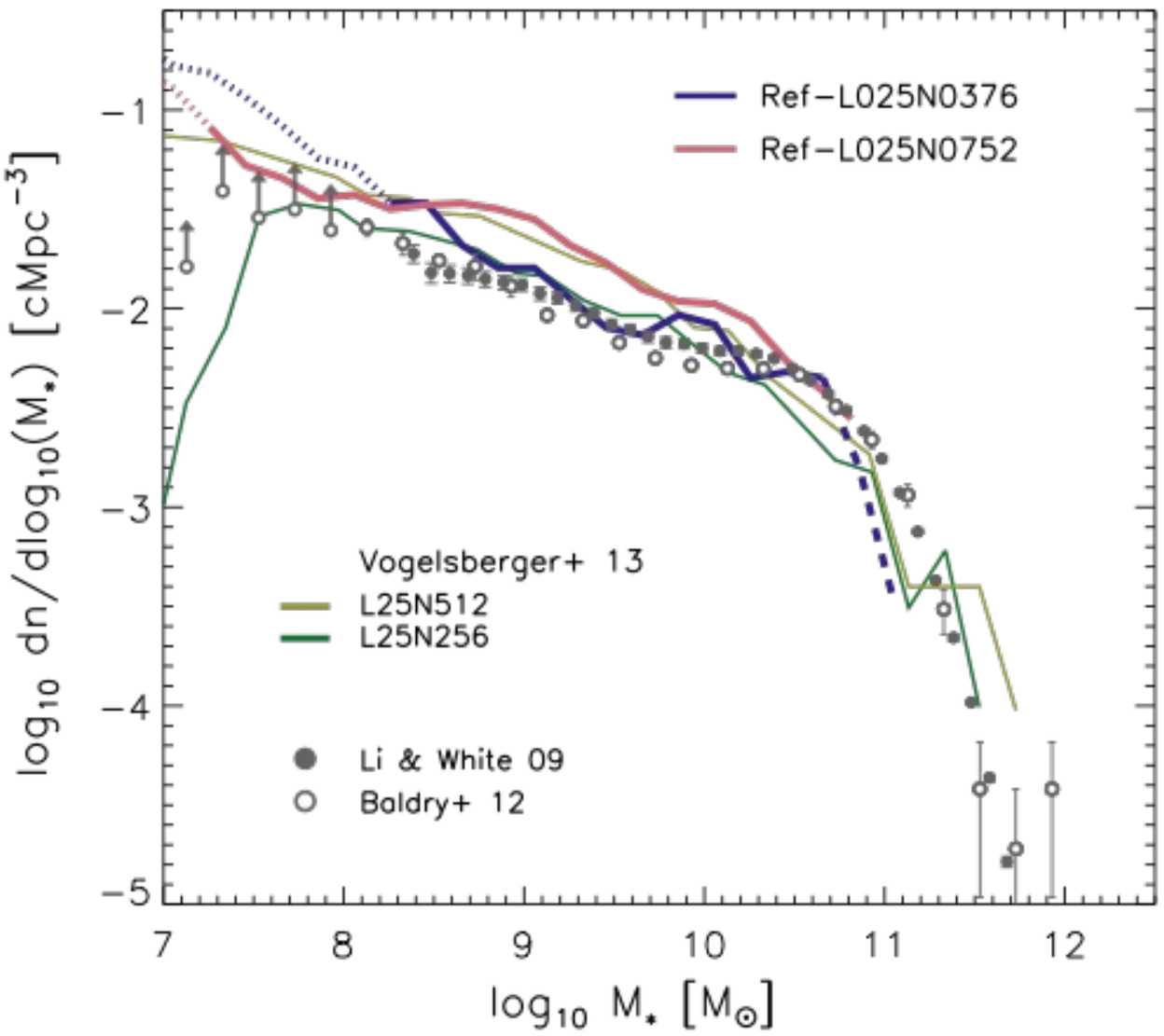
EAGLE: Evolution and Assembly of GaLaxies and their Environments

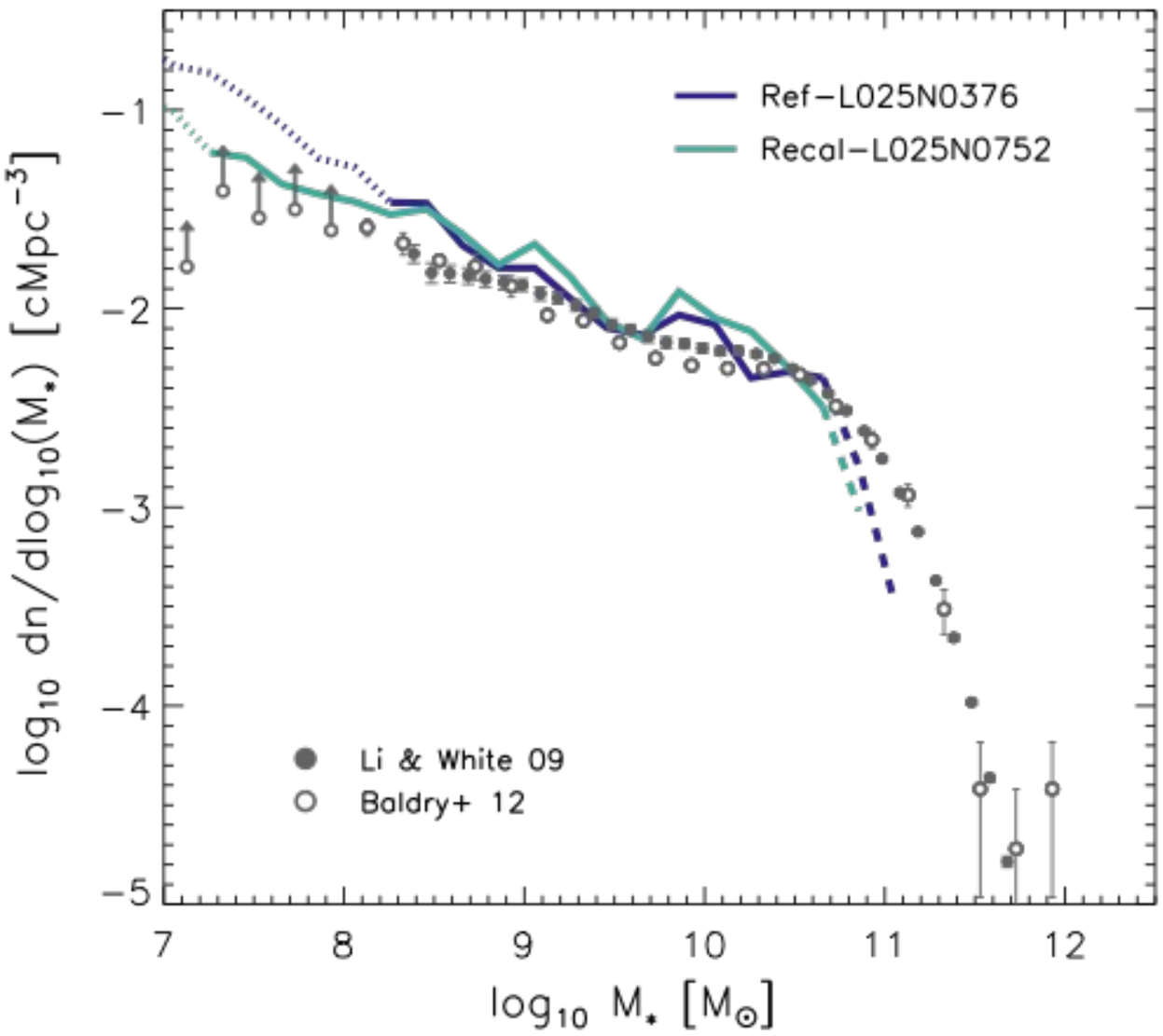
The evolution of intergalactic gas. Colour encodes temperature



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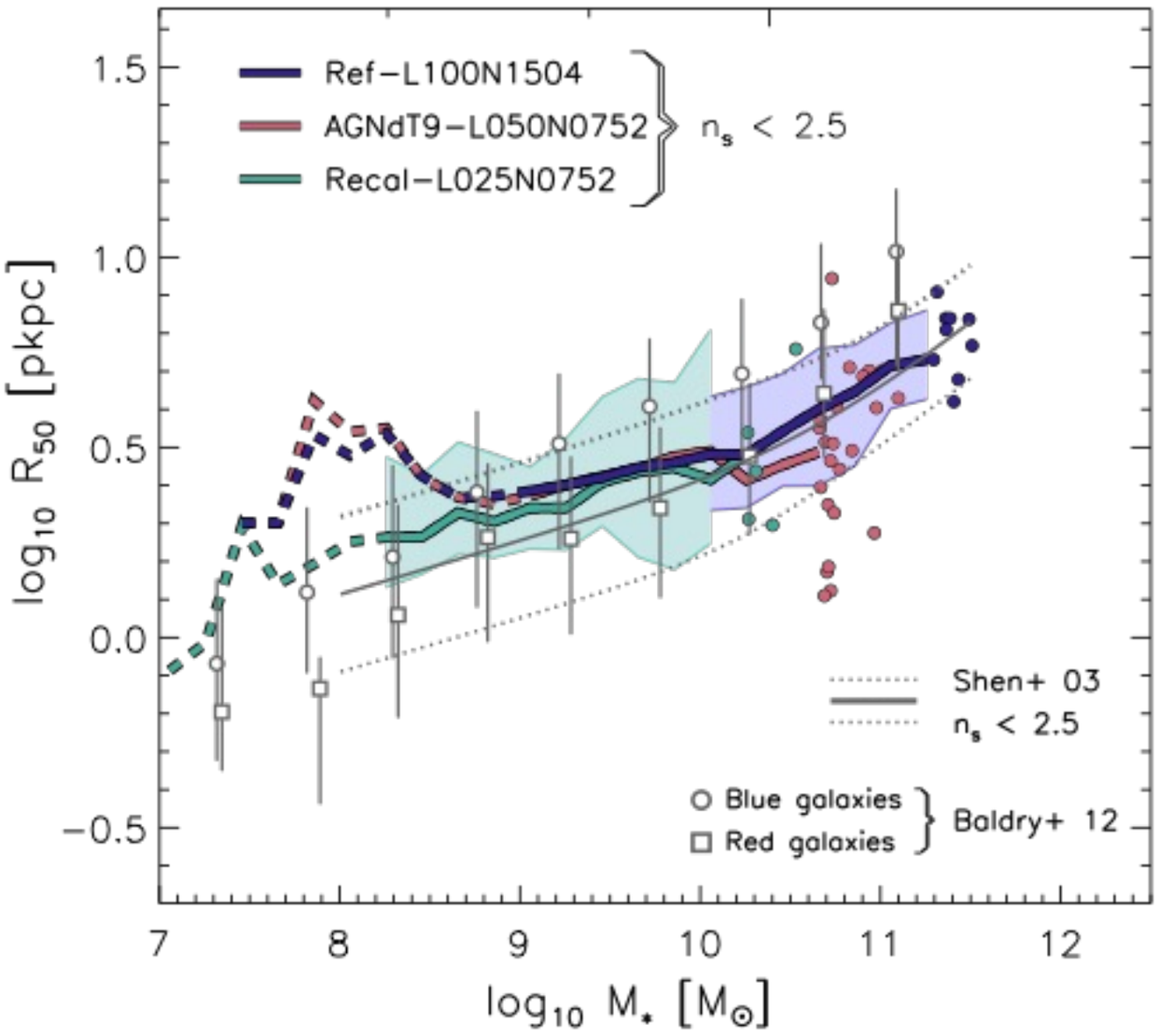


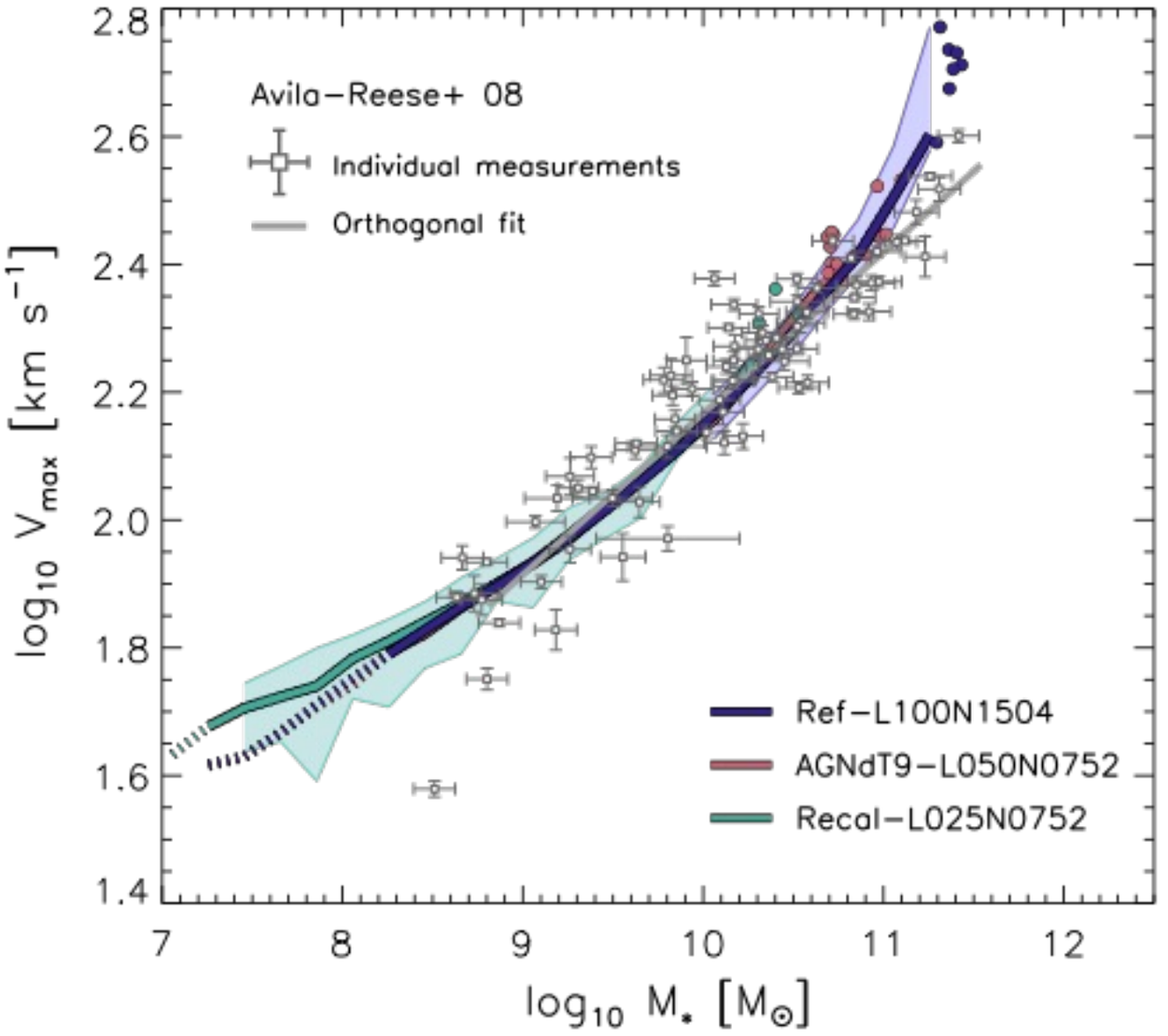


Schaye at al. (2015)

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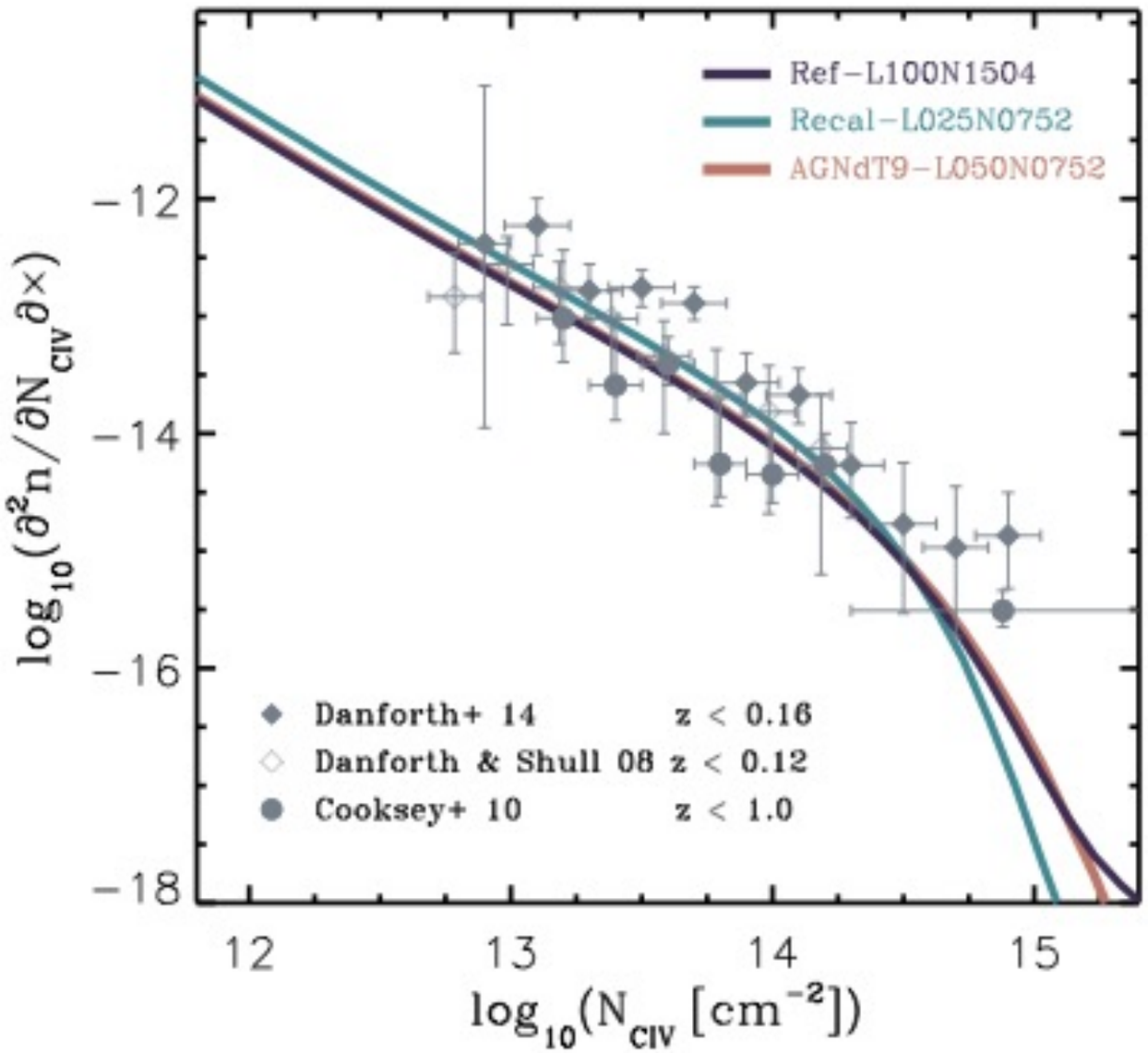


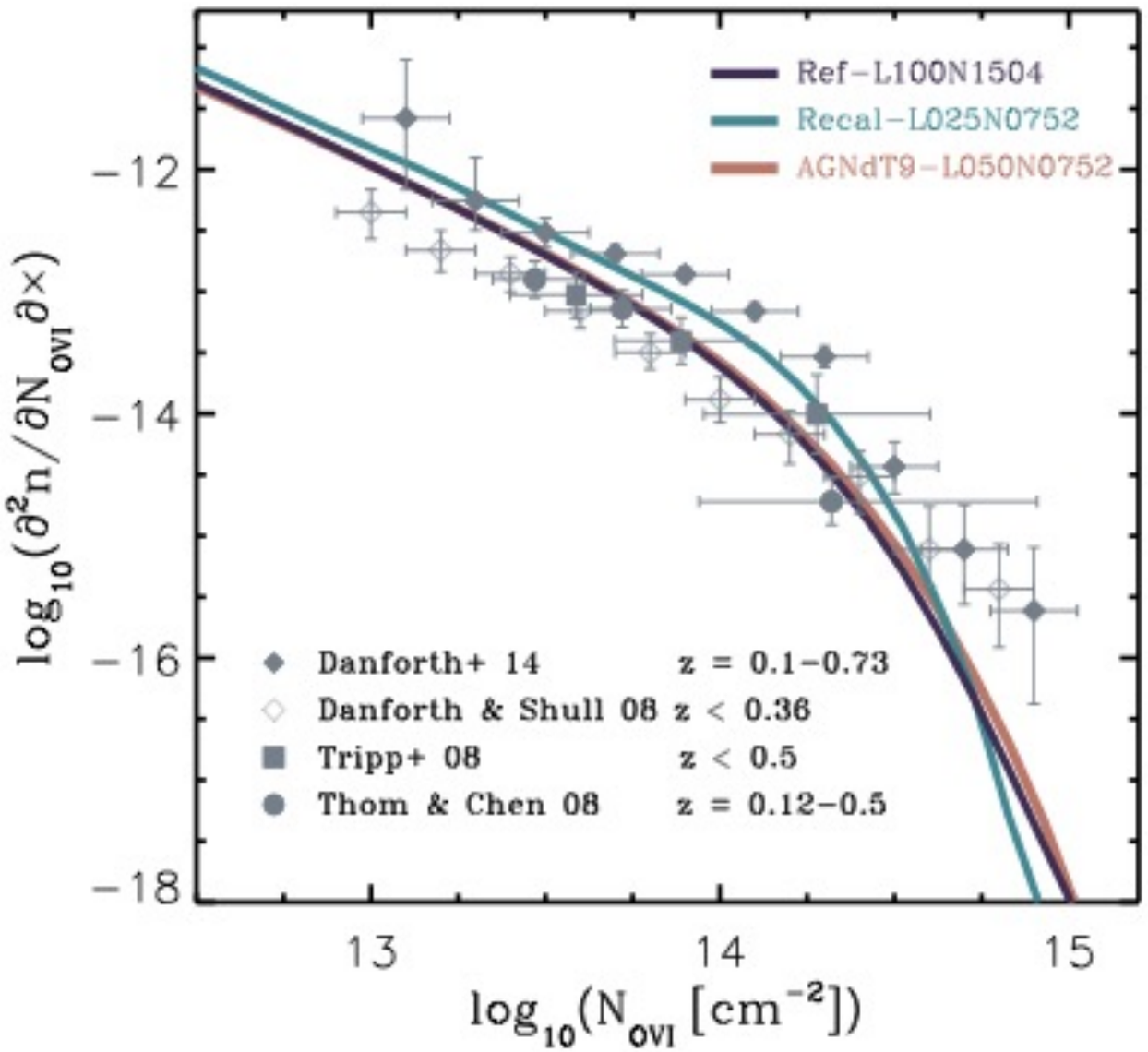


Schaye at al. (2015)

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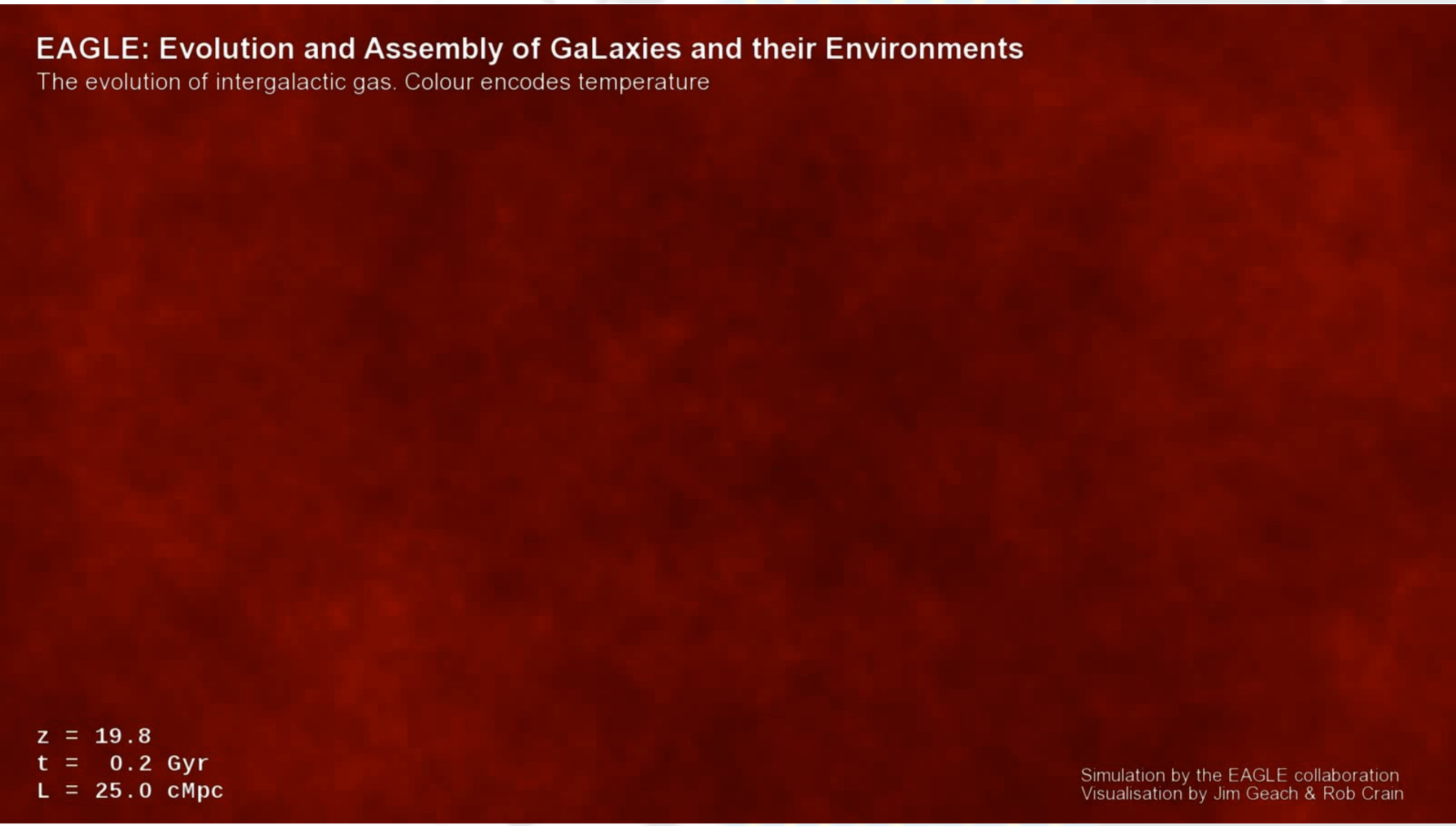




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EAGLE: Evolution and Assembly of GaLaxies and their Environments

The evolution of intergalactic gas. Colour encodes temperature



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