

Radiation-A Equality and Reionisation: Coincidence or Observer Selection?

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Issues with the Λ CDM model

- Tensions in recent H_0 measurements [e.g. rev. by Verde+ 2019]
- Predicted Λ / Observed Λ ~ 10^{120}
- Coincidences?



... "Worst theoretical prediction in the history of physics"?

[Hobson, Efstathiou & Lasenby 2006]

Beyond LCDM

- $w \neq -1$?
- Modified gravity?
- Observeer
 - selection?

[[]Lombriser & Smer-Barreto 2017]

Consistently Modelling Star Formation & Reionization



Star formation within a halo

High $z \longrightarrow SFR \sim M_{gas}/t^*$ Low $z \longrightarrow SFR \propto gas cooling rate$ $\rho_g(r) \sim \left(\frac{R_{vir}}{r}\right)^{\eta}$ $t_{cool}(r) \sim \frac{1}{\rho_g(r) \Lambda(T)}$ $\frac{dM_{cool}}{dt} = 4\pi \rho_g(r_{cool}) r_{cool}^2 \frac{dr_{cool}}{dt}$

[Hernquist & Springel 2003]

Problems:

- Star formation never ends
- No feedback included

R

cool



[Sorini & Peacock in prep.]

Solutions:

- Proper calculation of cooling time
- Modelling baryon fraction in haloes

Cosmic Star Formation Rate Density





[Sorini & Peacock in prep.]

Conclusions & Perspectives

- We developed a semi-analytic model of cosmic star formation that improves Hernquist-Springel formalism
- **Outlook**: we will use our model to investigate the coincidence between radiation- Λ equality and the epoch of reionization