Can we know anything about **globular cluster formation** by studying the relation between globular cluster - host halo?

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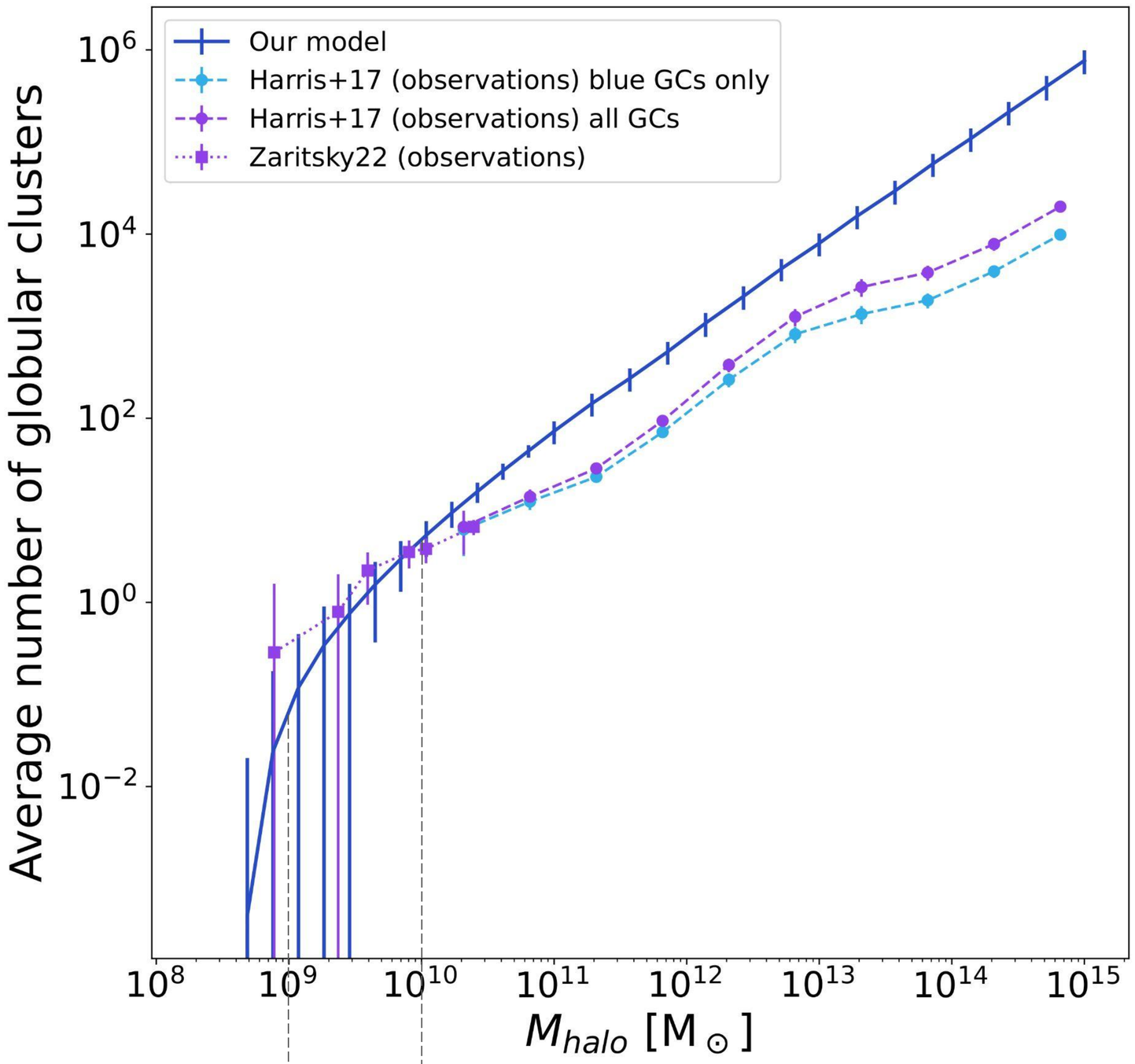
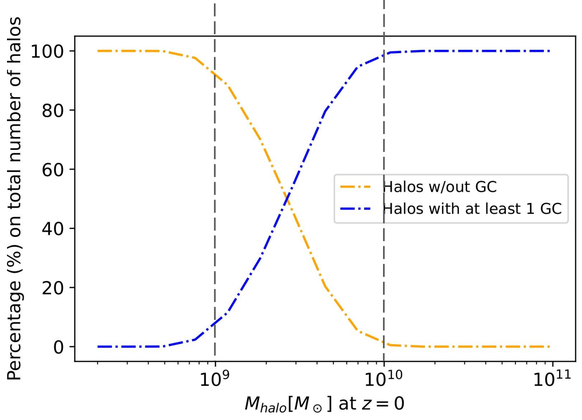
Primordial globular cluster models could explain the relation between globular cluster number – dark matter halo mass

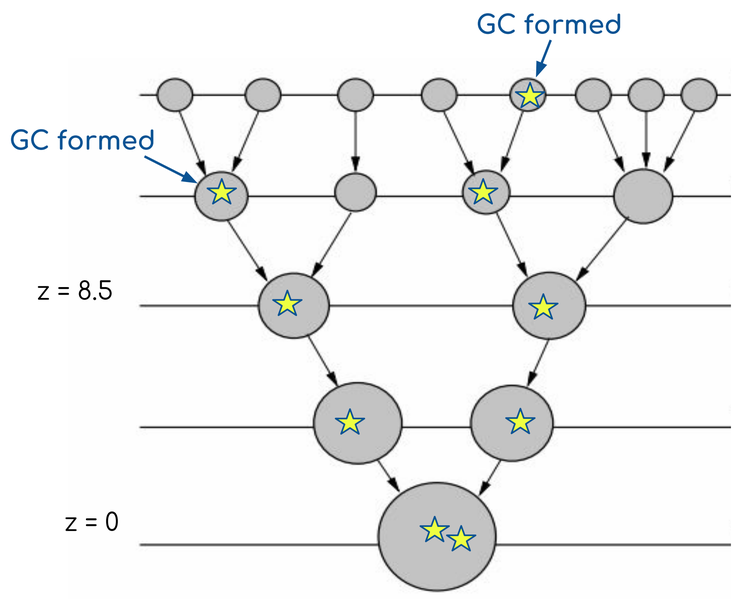
GCs are groups of thousand-million old stars (>10 Gyr), radius ~ a few pc, unknown formation process(es). How can we know GC formation channel, using that observational relation?





At $M_h \approx 3 \times 10^9 M_\odot$, 50% of halos host at least one GC.

We used a toy model in which GCs form in DM halos when $\begin{cases} z & \geq 8.5 \\ M_h & \geq 10^8 M_\odot \end{cases}$ (before reionization) (in 'massive' minihalos)



Our model predicts the maximum number of primordial GCs in host halos at z = 0 (figure, solid line). We compare this to observations of the mean number of GCs in halos (dotted/dash lines).

Take-home points

- Primordial globular clusters are those that formed in dark matter mini halos at high redshift (Peebles 1984).
- Our primordial GC model matches well to the observed relation between GC number & host halo mass at low mass ($M_h \leq 10^{10} M_\odot$).
- Assuming our model, in halos with $M_h > 10^{10} M_\odot$, only **2%-45%** of primordial GCs survive till present time.

References
- Parkinson, H., Cole, S., & Helly, J. 2008, MNRAS, 383, 557
- Peebles, P. J. E. 1984, ApJ, 277, 470
- Harris, W. E., Blakeslee, J. P., & Harris, G. L. H. 2017, ApJ, 836, 67
- Zaritsky, D. 2022, MNRAS, 513, 2609