Finding Local Dwarf Galaxies in HI

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with

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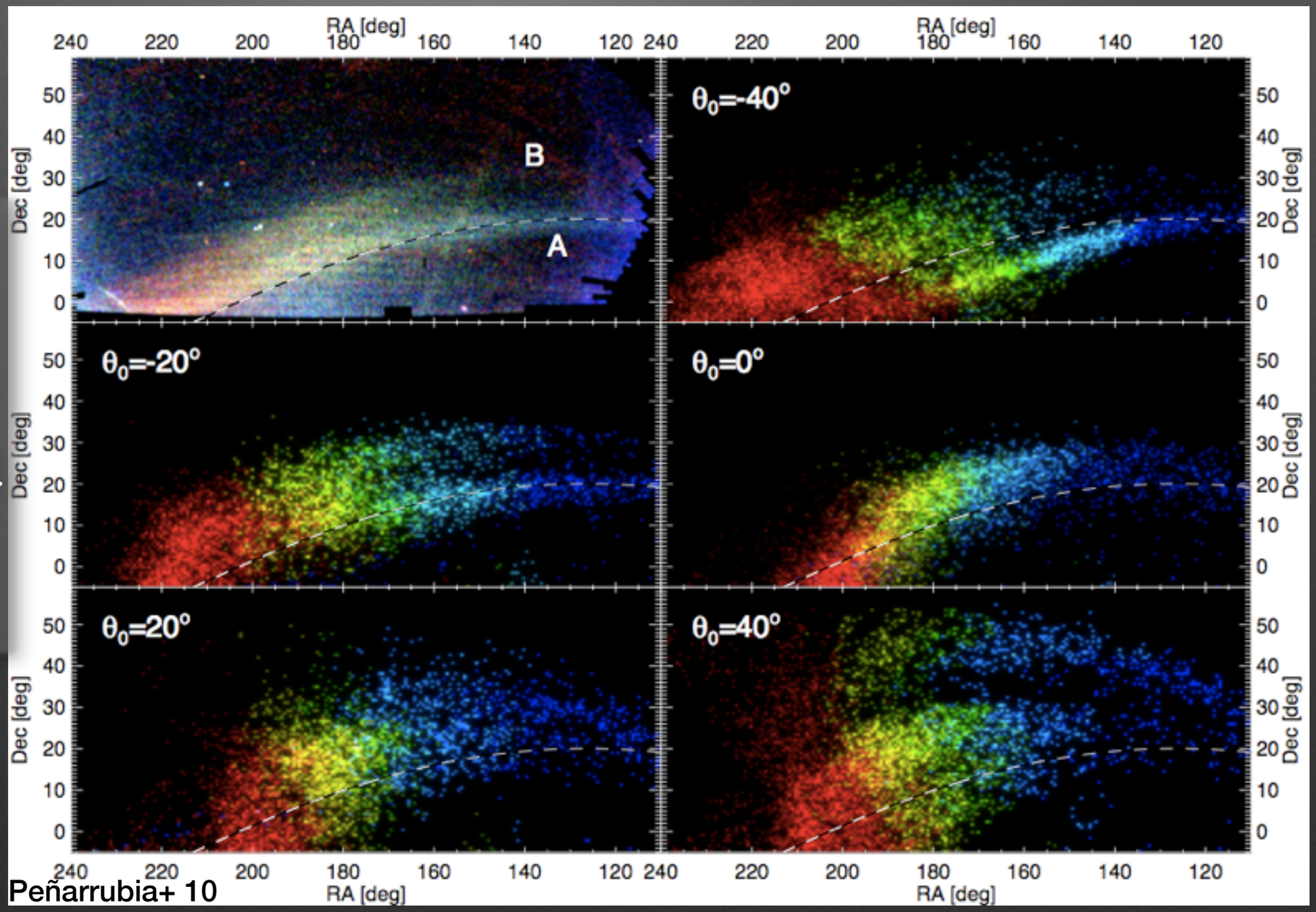
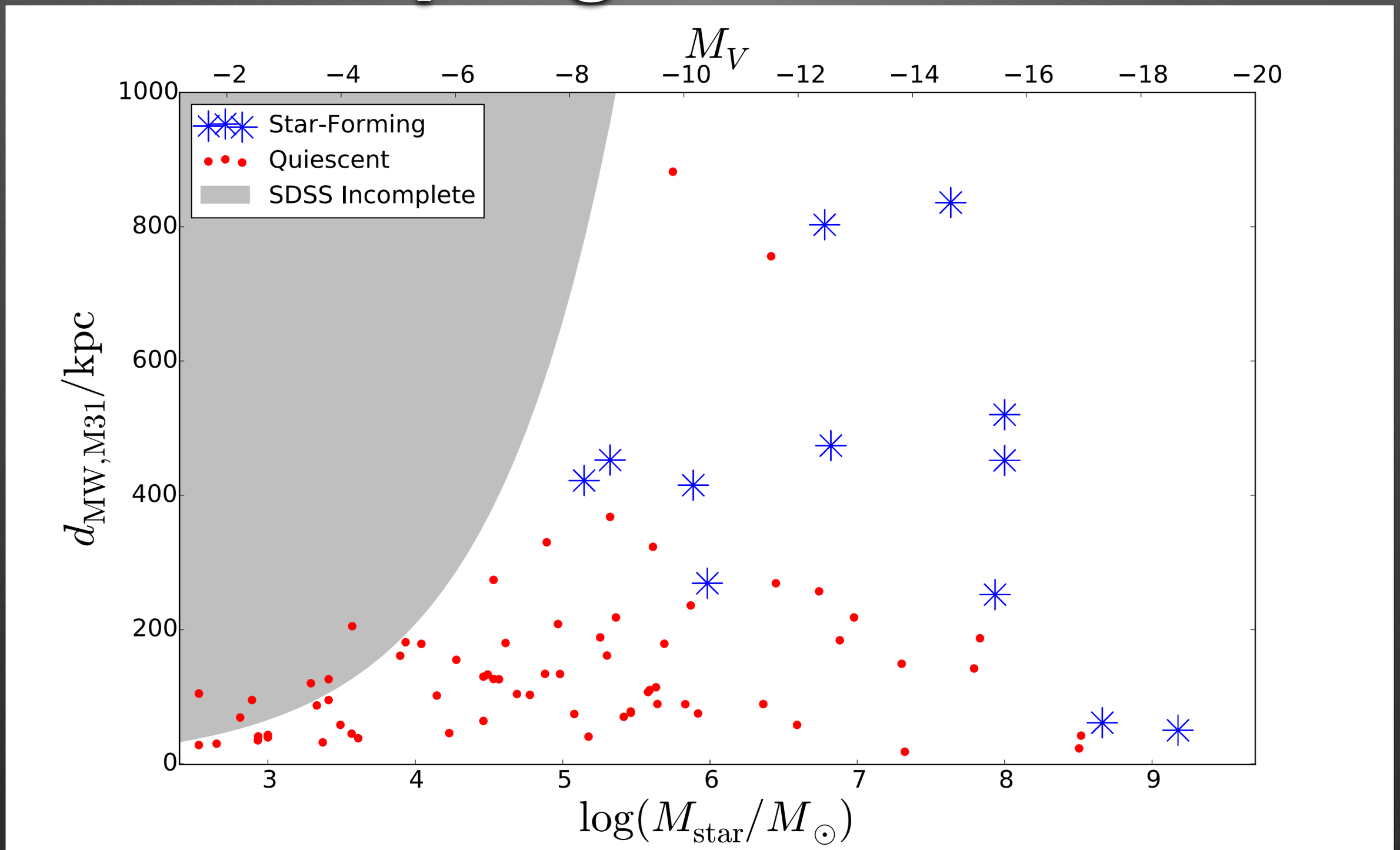
“Initial Conditions” of Satellites Are Important

E.g. Existence and orientation of a disk matters



Peñarrubia+ 10

So where can we look for progenitors?



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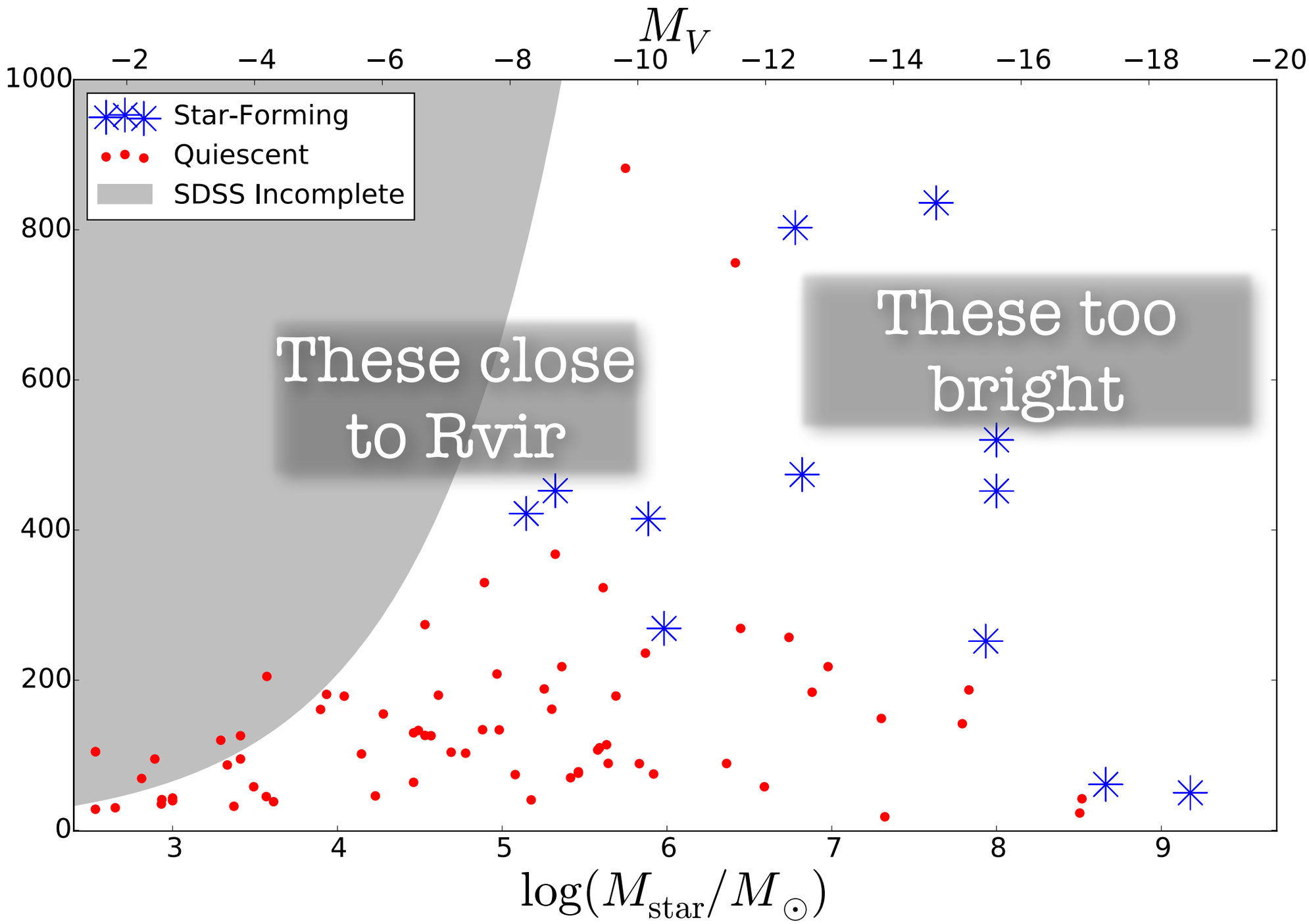

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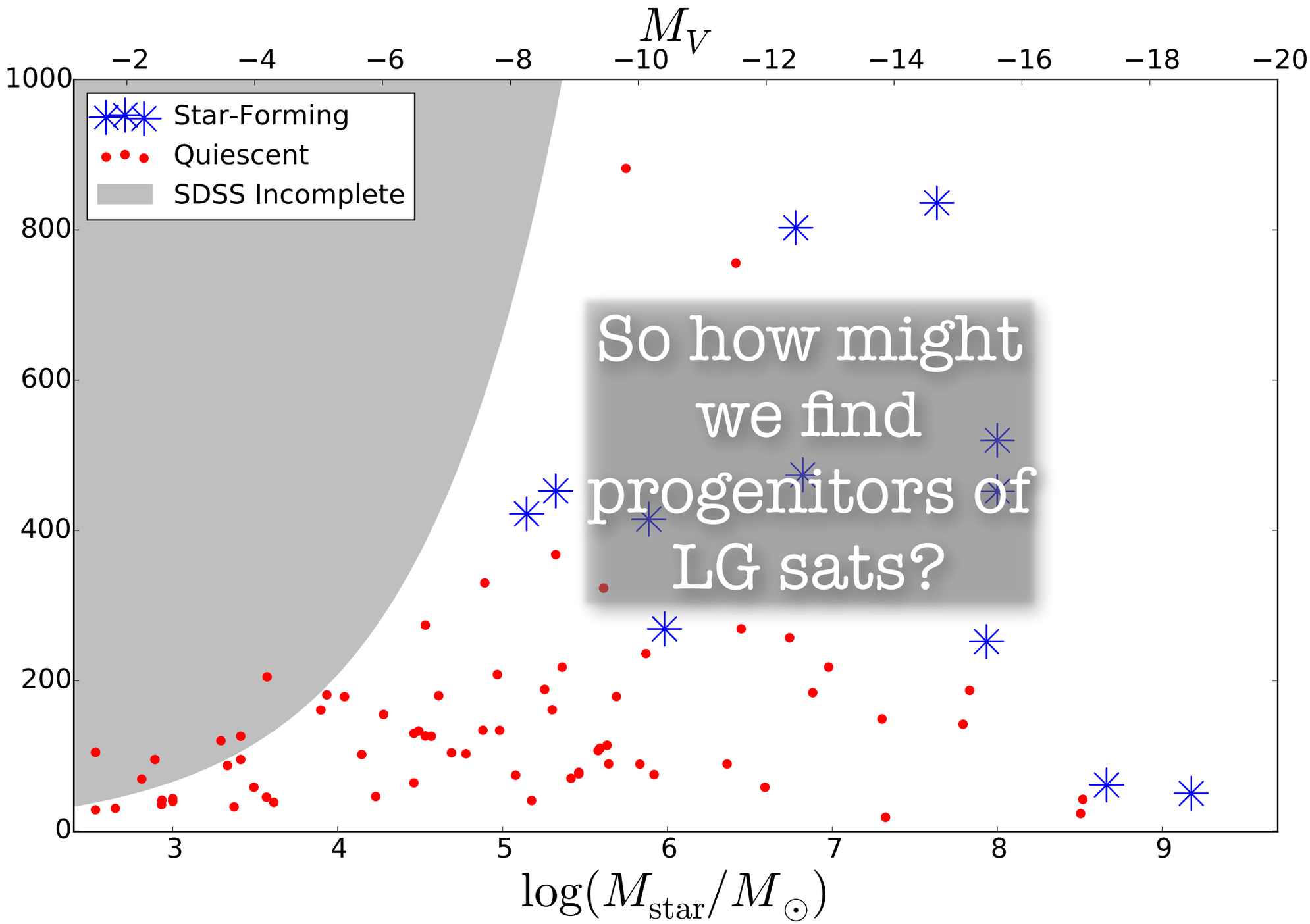
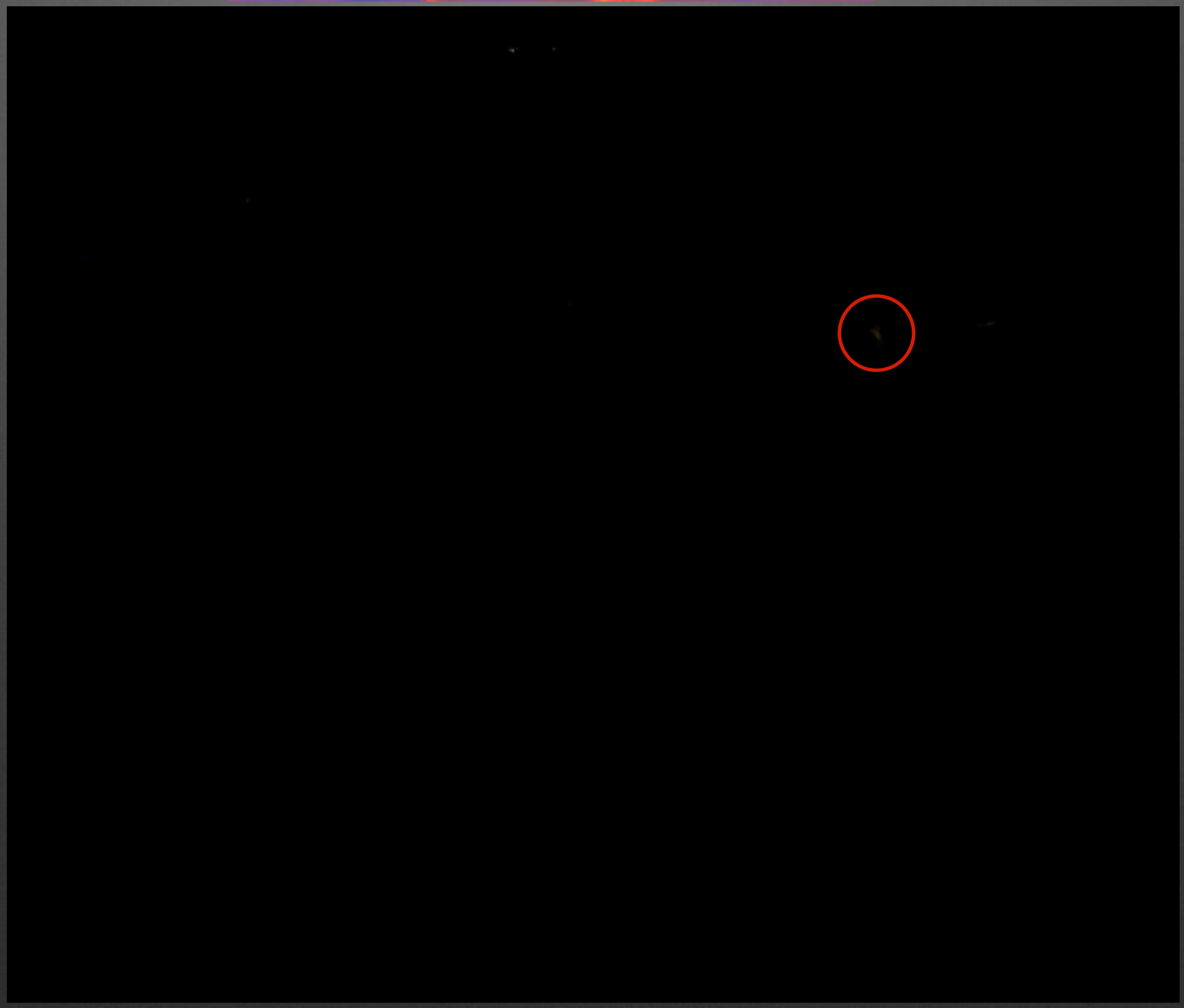


GALFA HI

DR1, Peek+ 11



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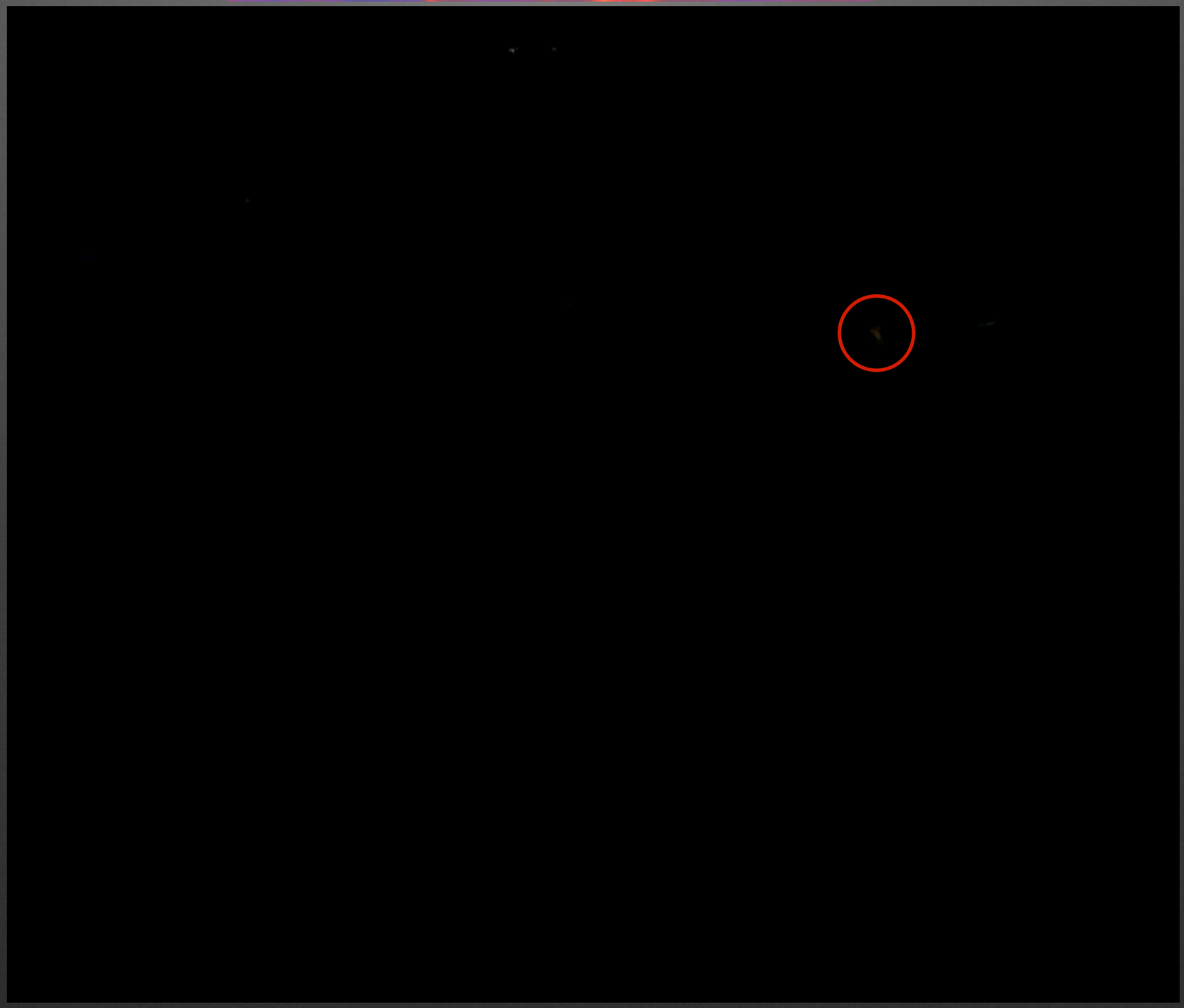
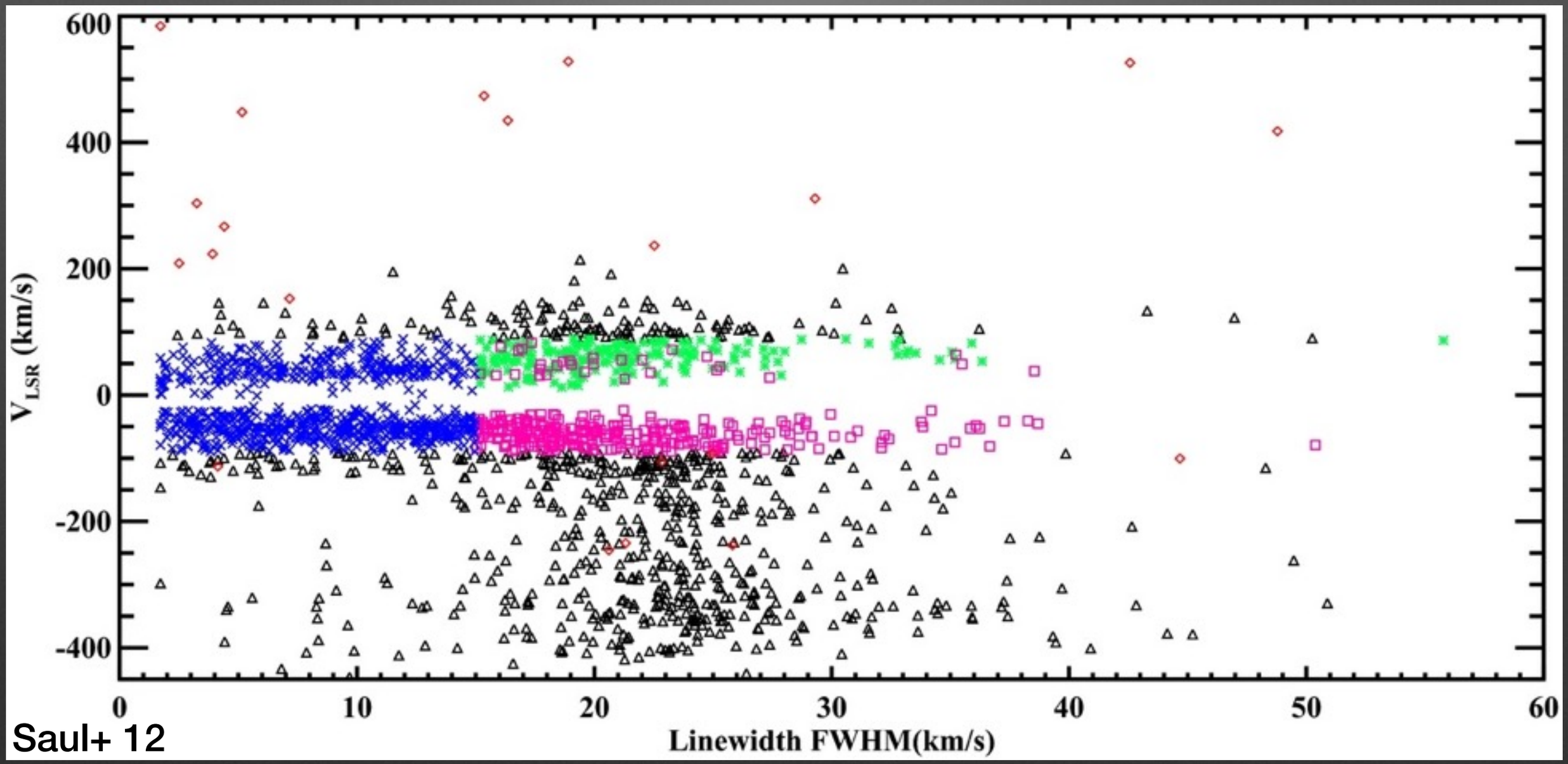


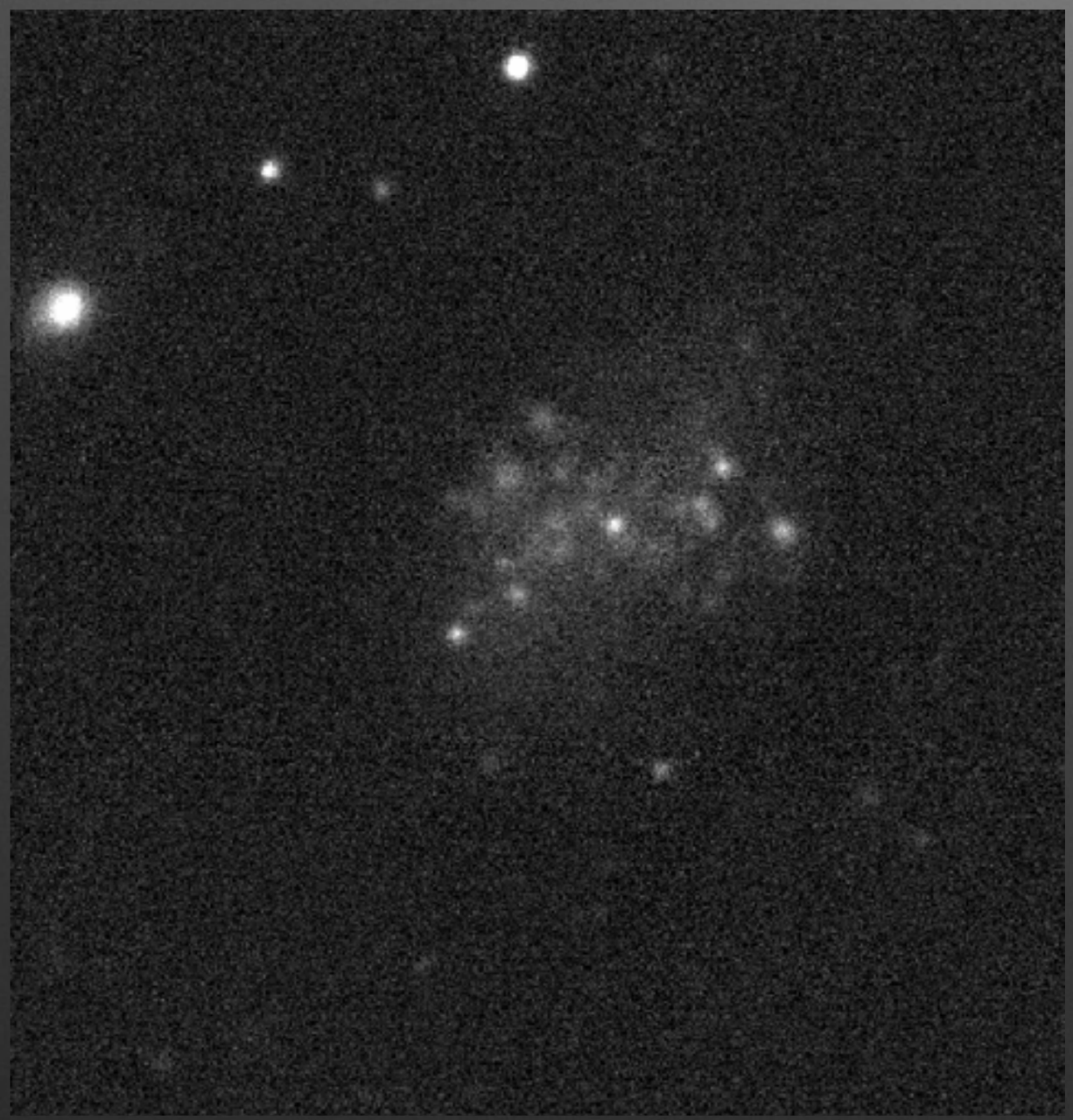
Look for HI blobs that are not Galactic



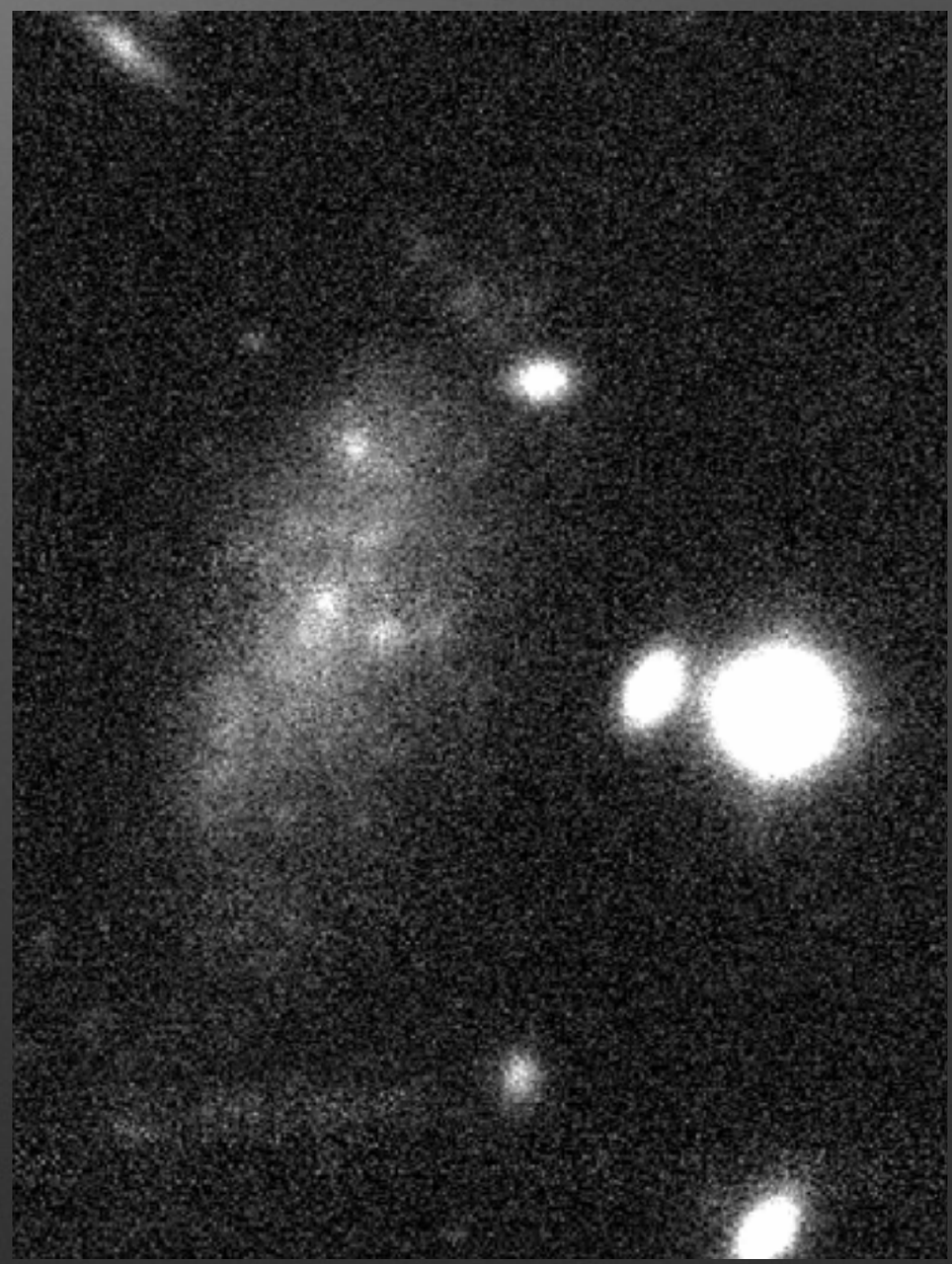
Saul+ 12

Four (of ~ 30 candidates) have dwarfy optical counterparts

Pisces A

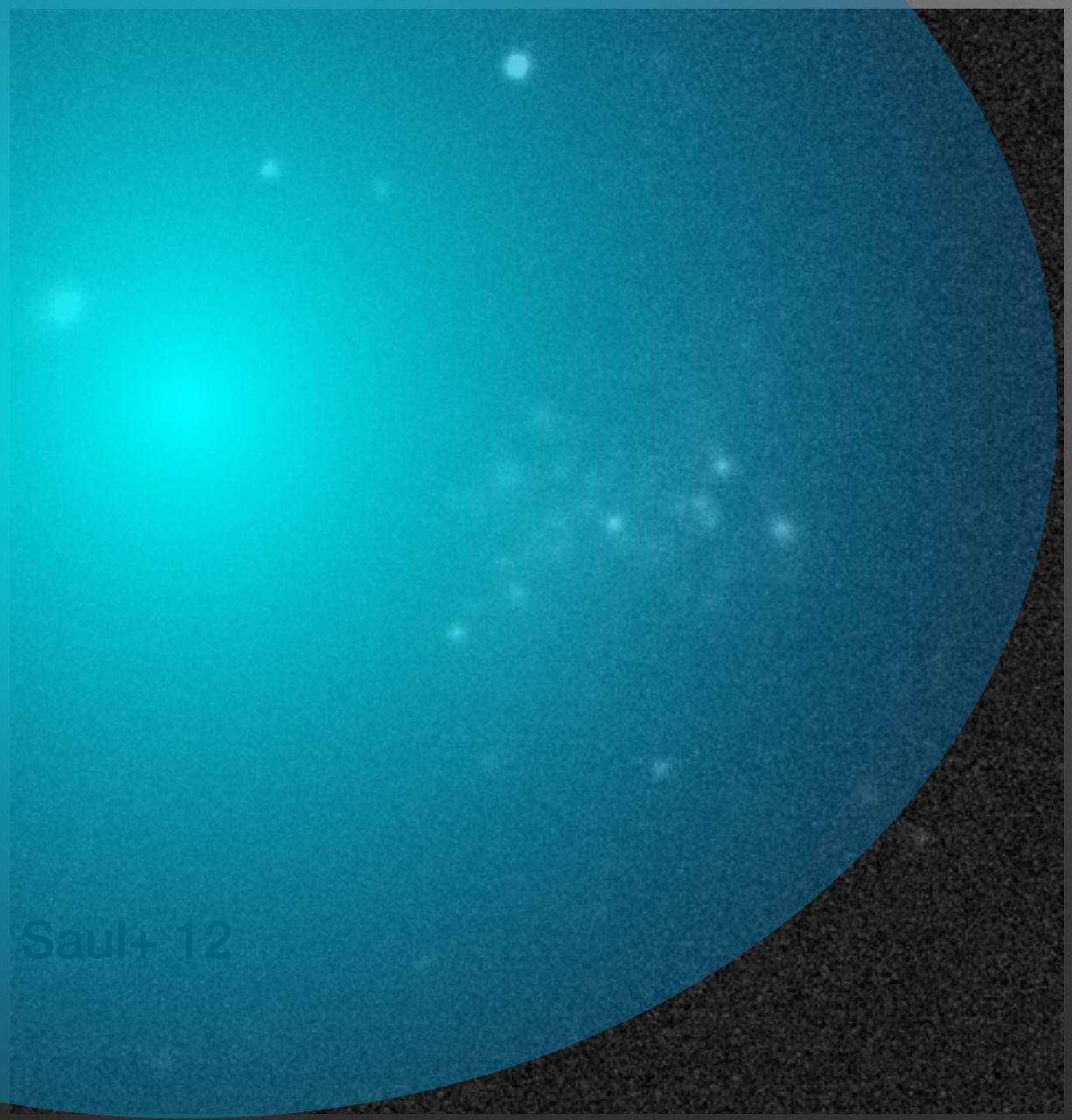


Pisces B

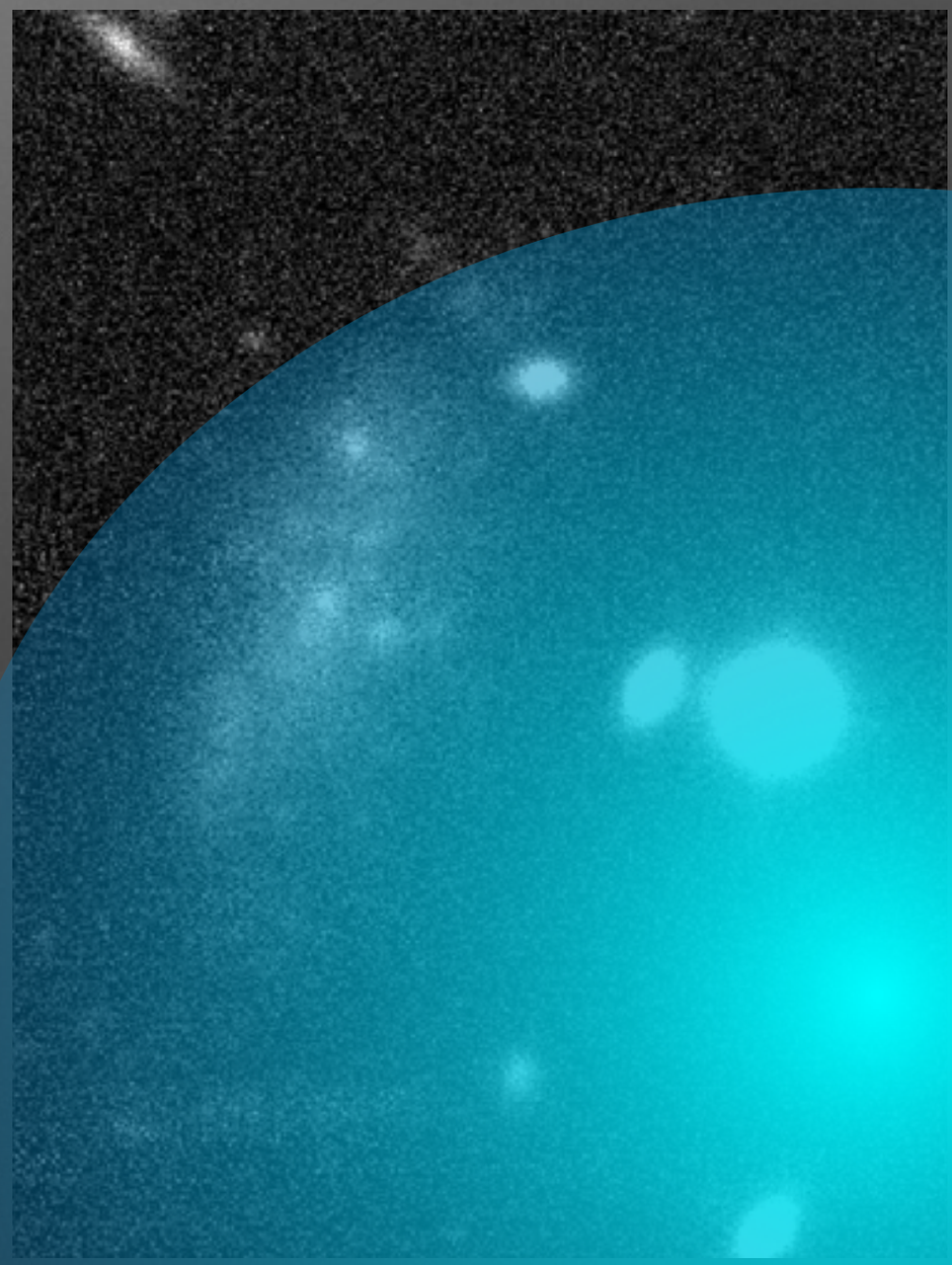


(See Sand+ 15 for other two)

But are these the HI sources?



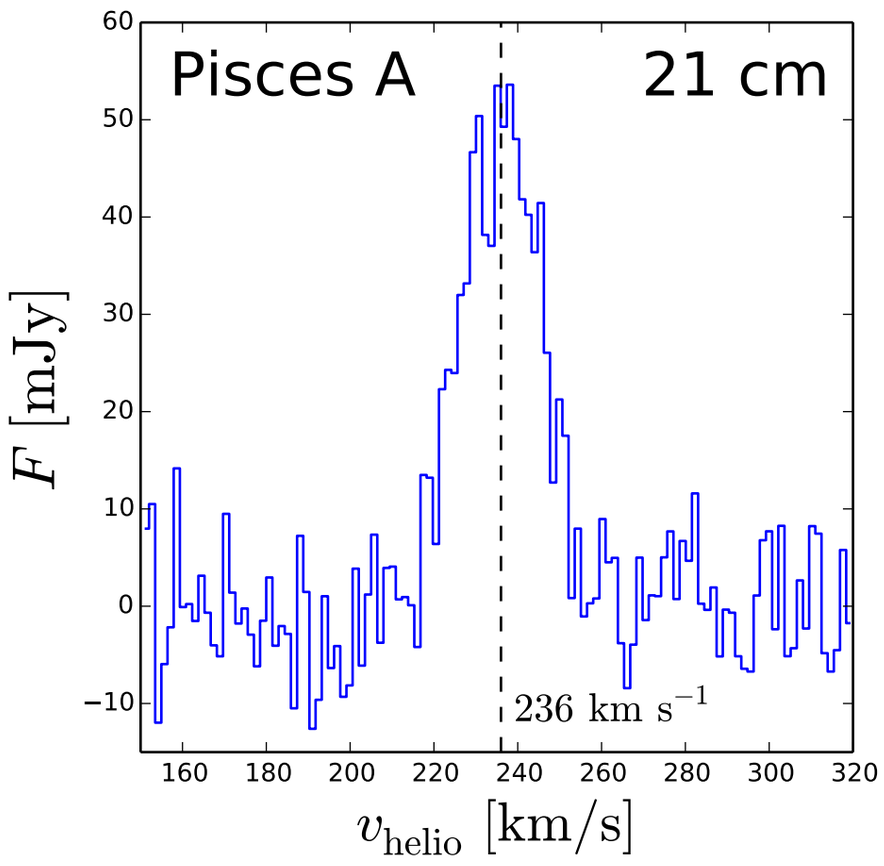
Saul+ 12

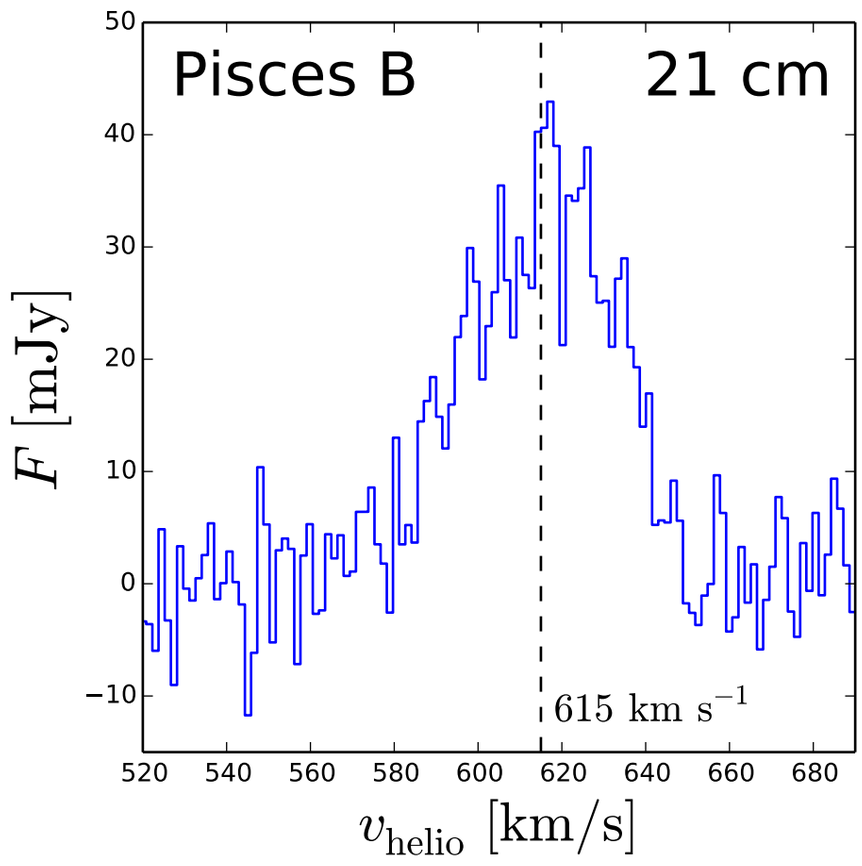


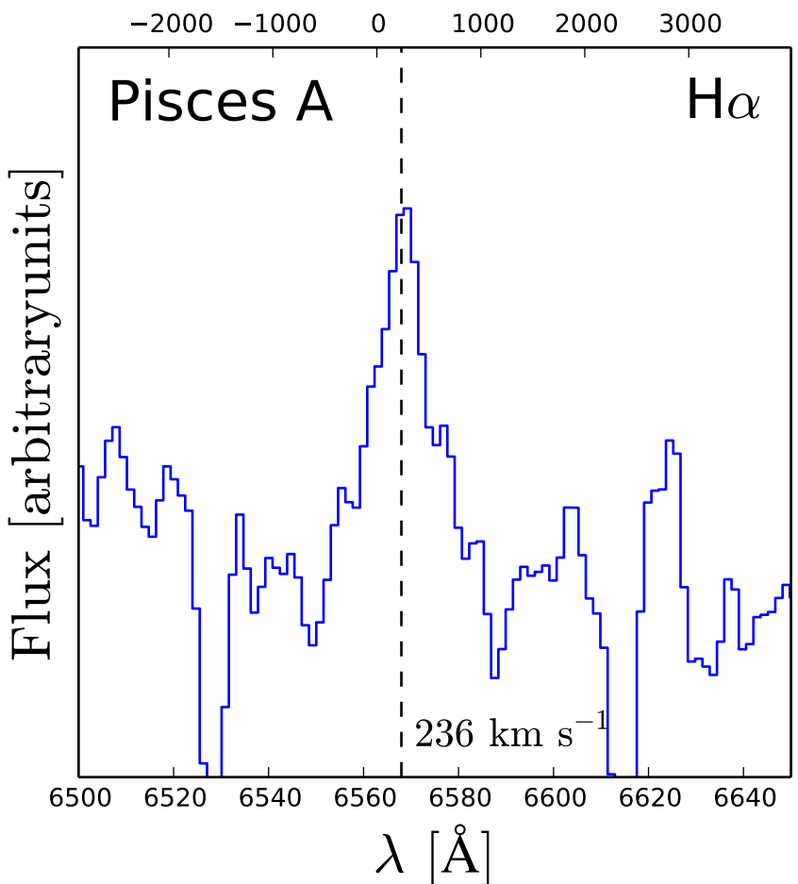
The HI and Hα velocities match

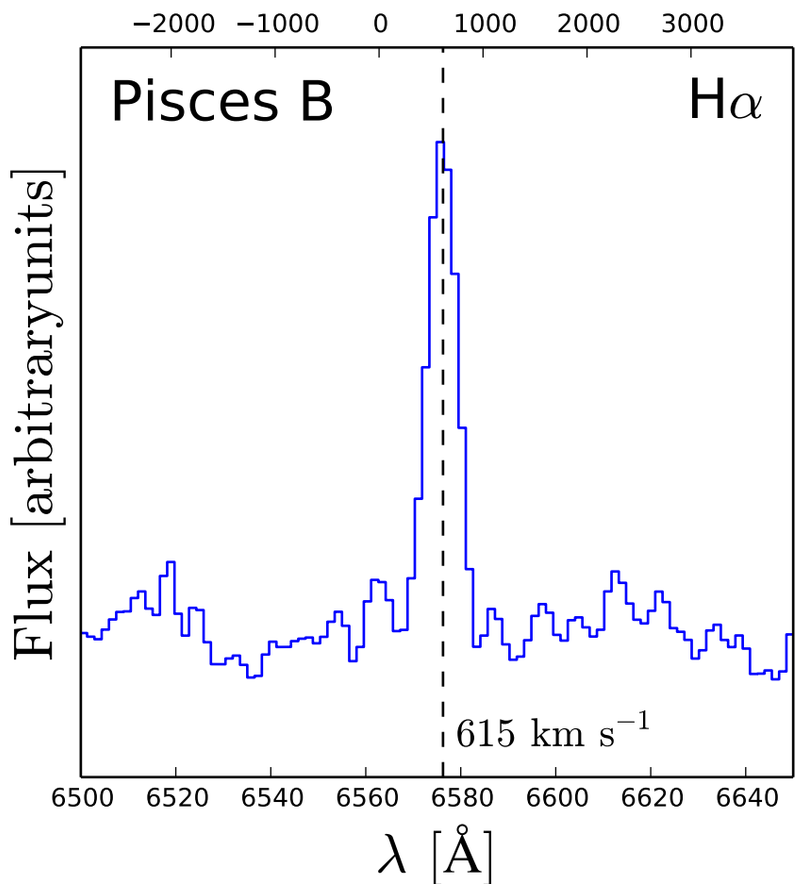
Radio

Optical

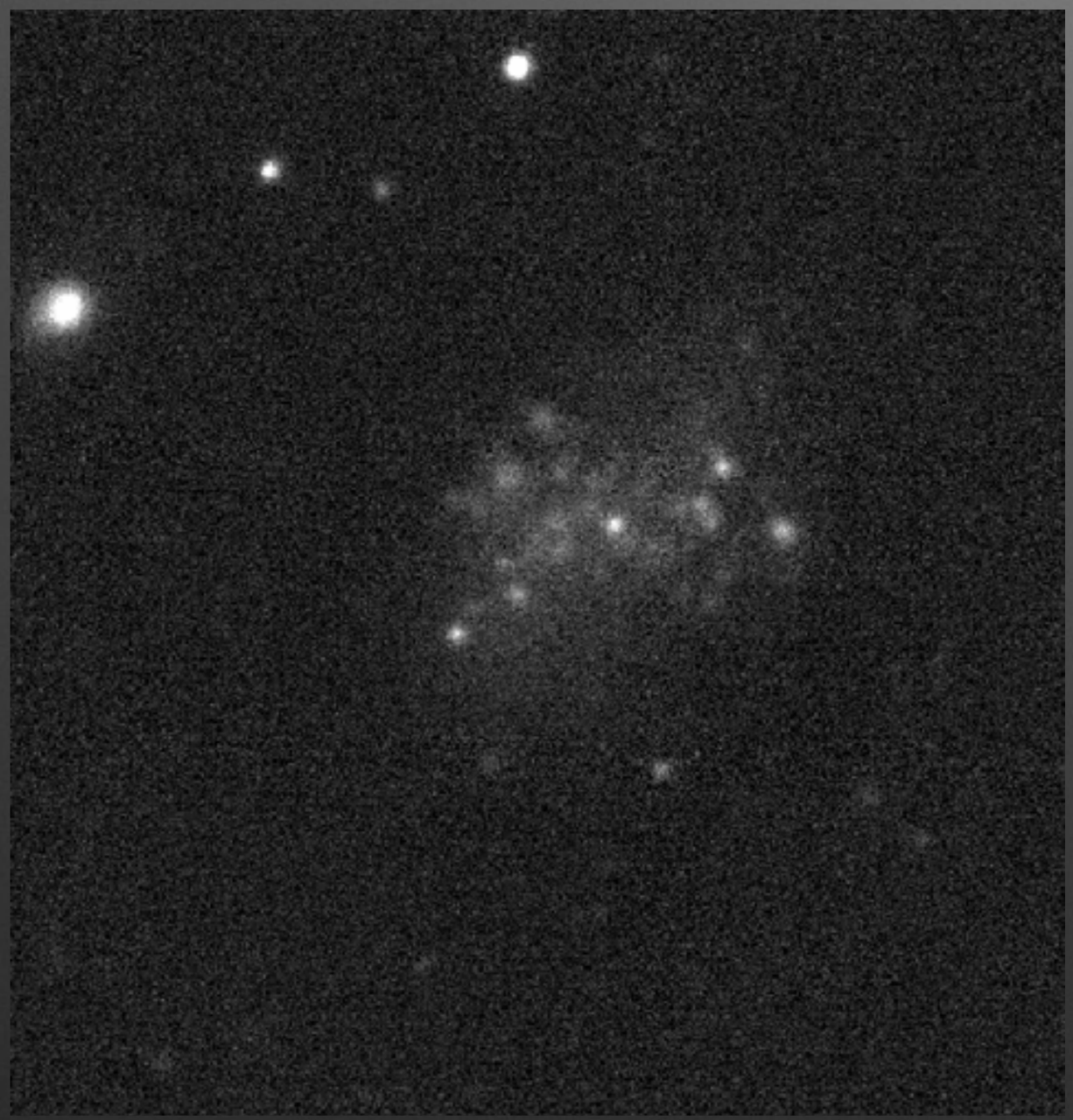


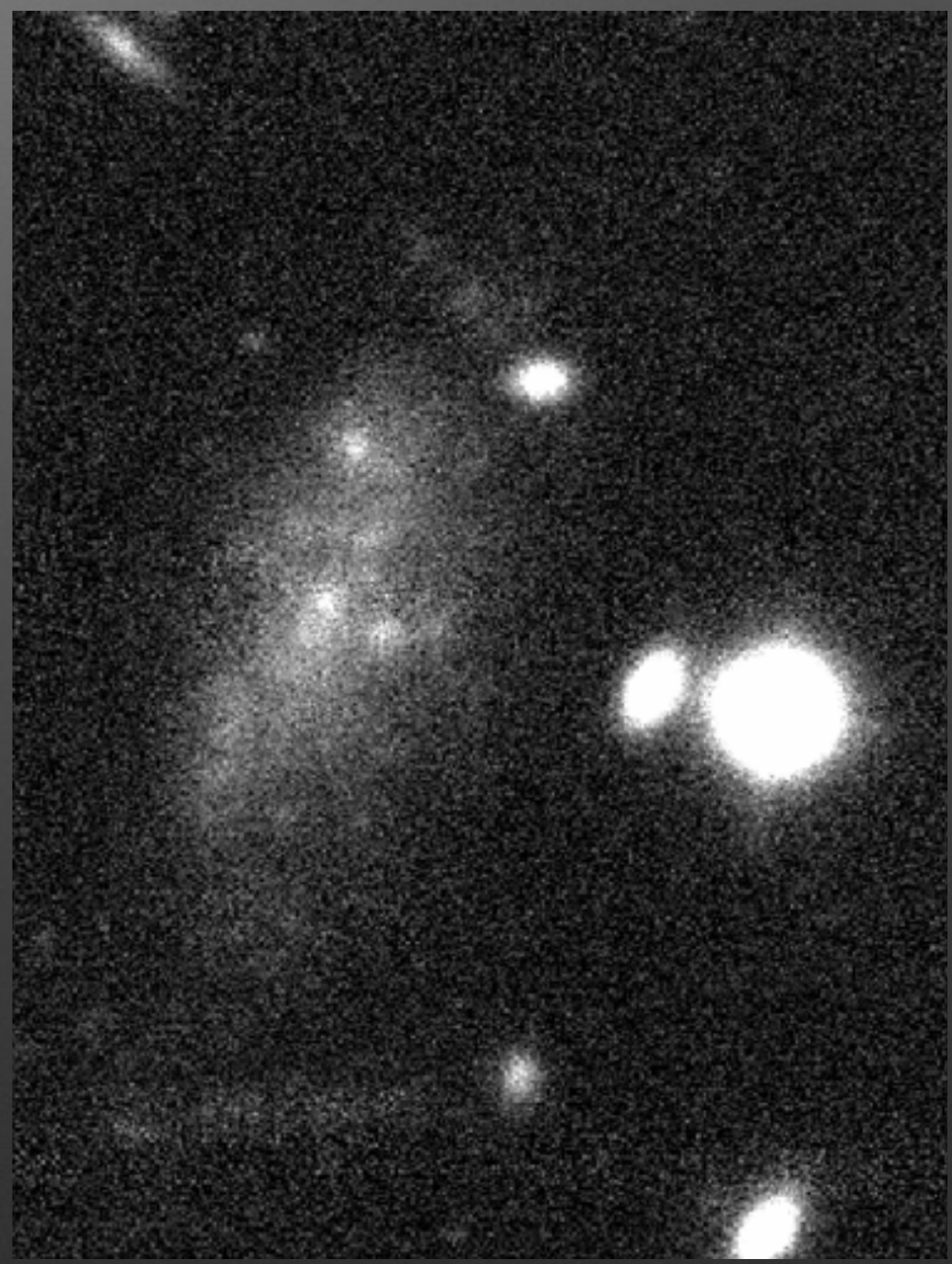






HST imaging closes the case





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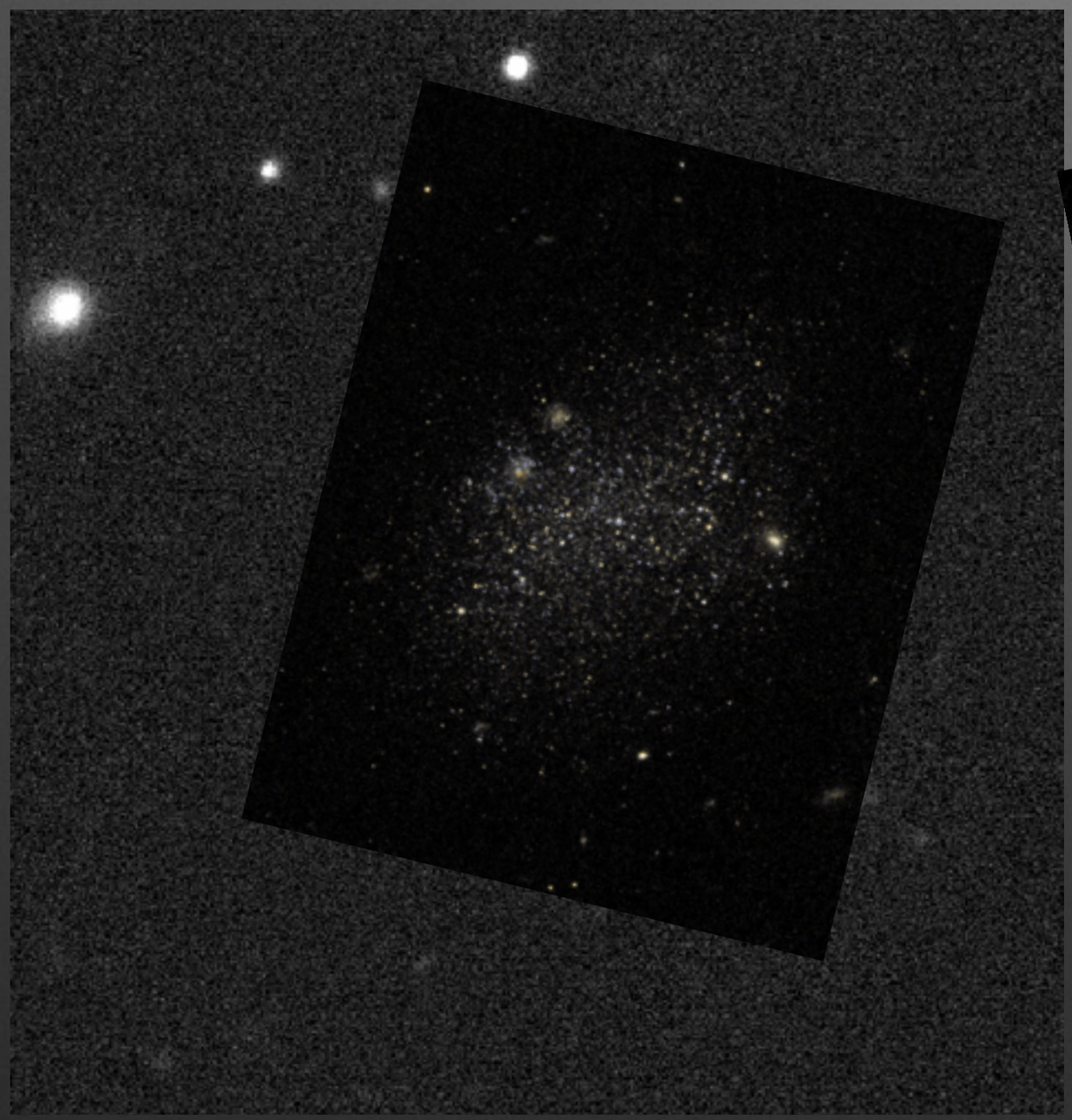
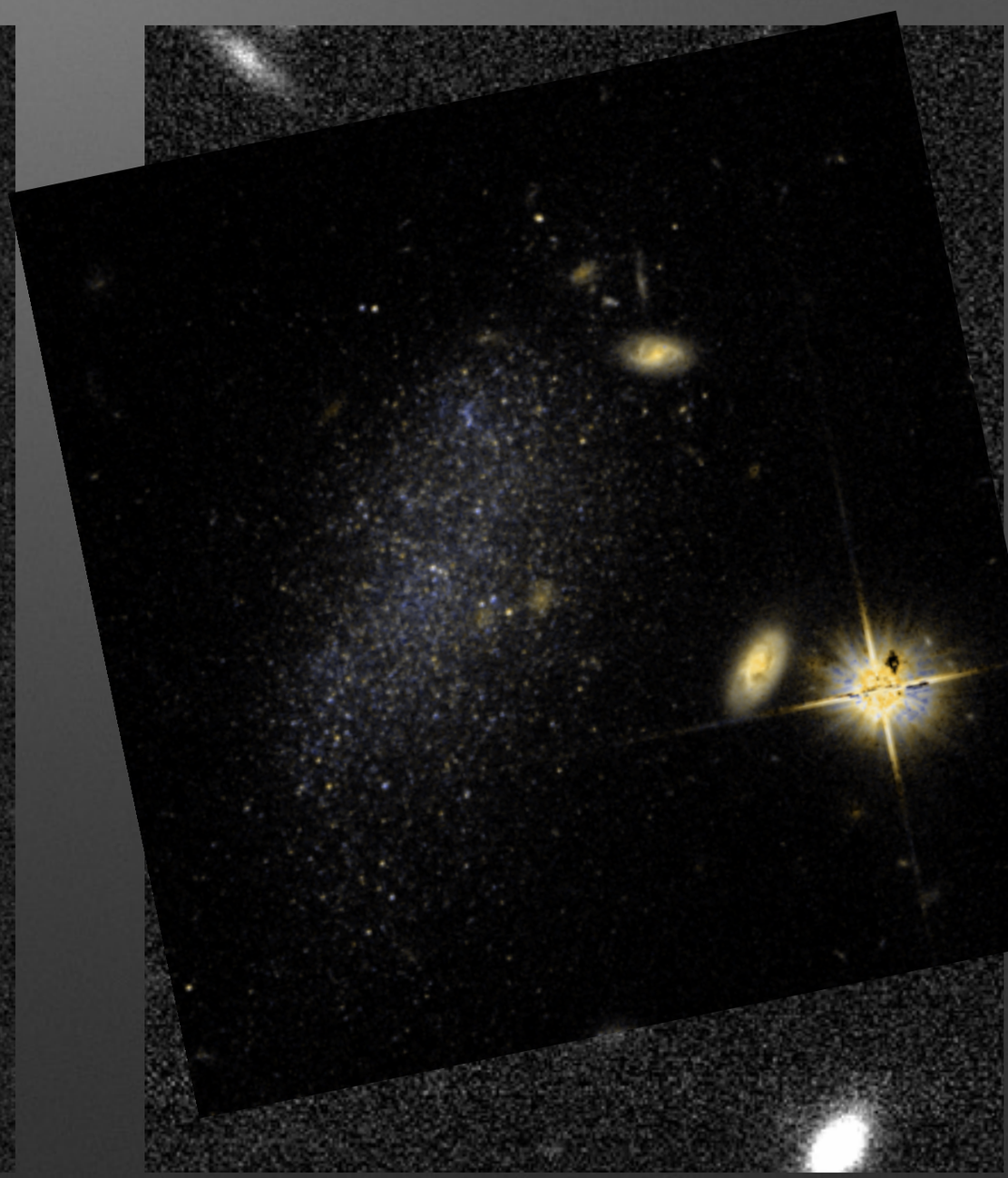
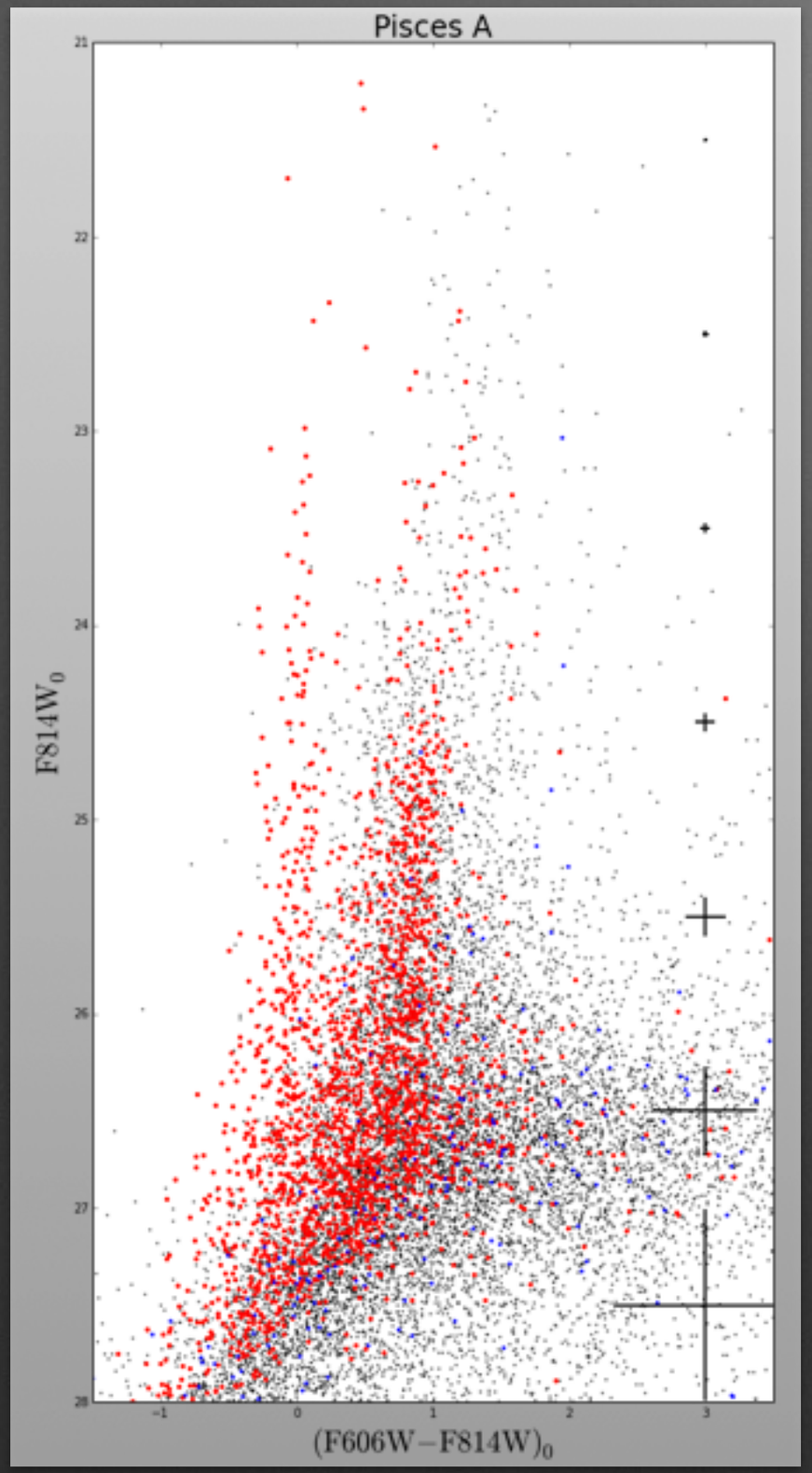
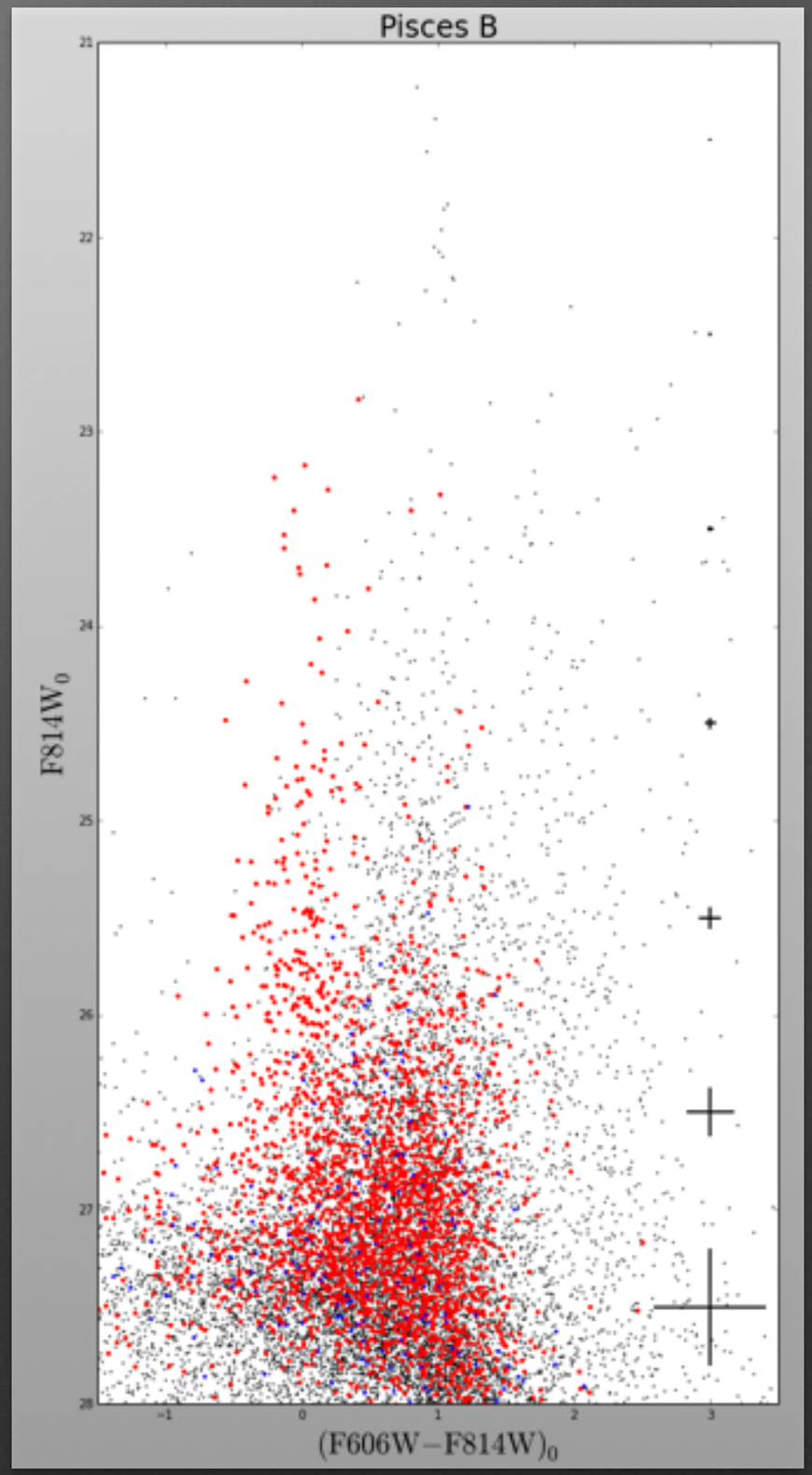


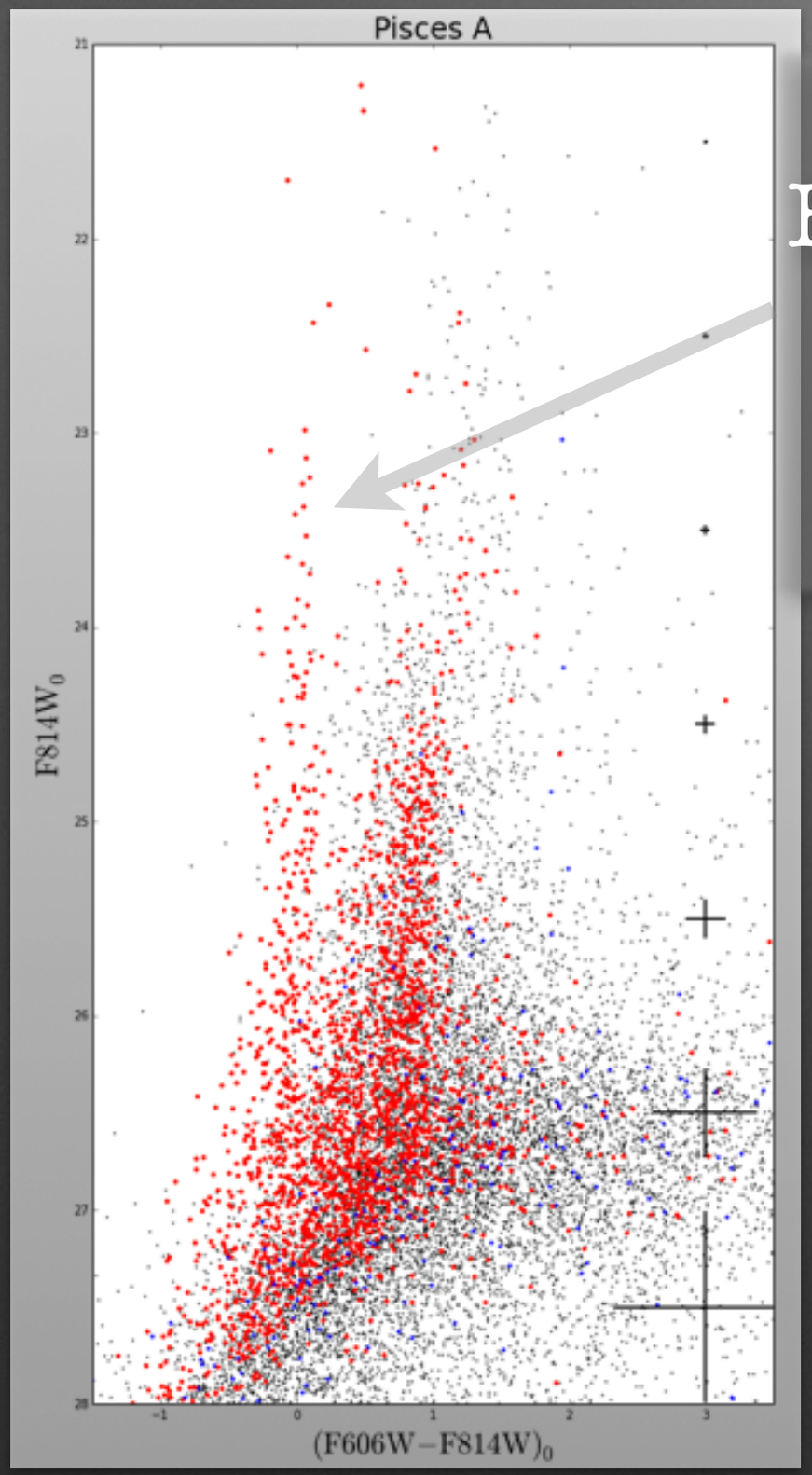


HST yields CMDs

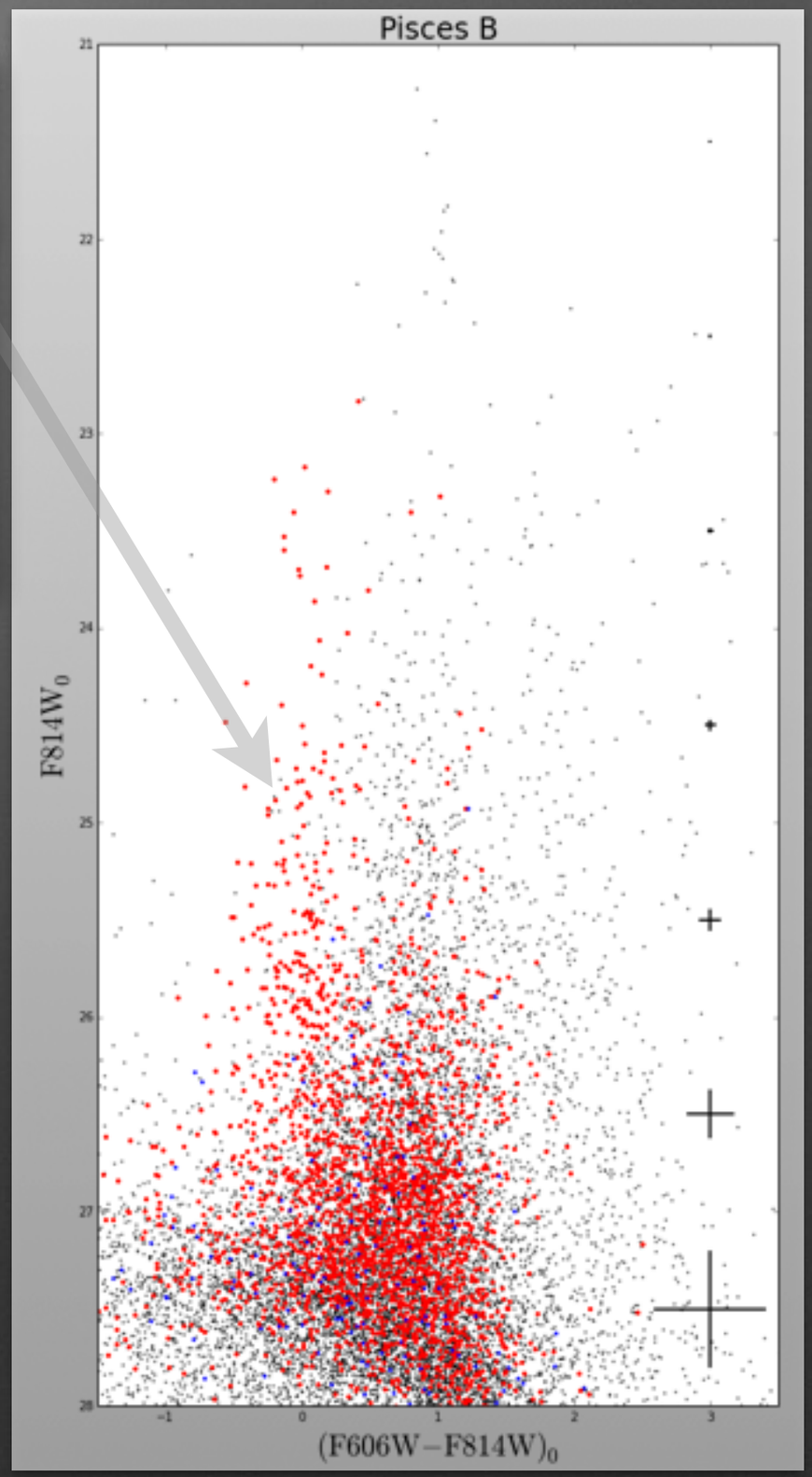




CMDs show star formation, RGB



Strong Blue Plume = lots of light from recent SF



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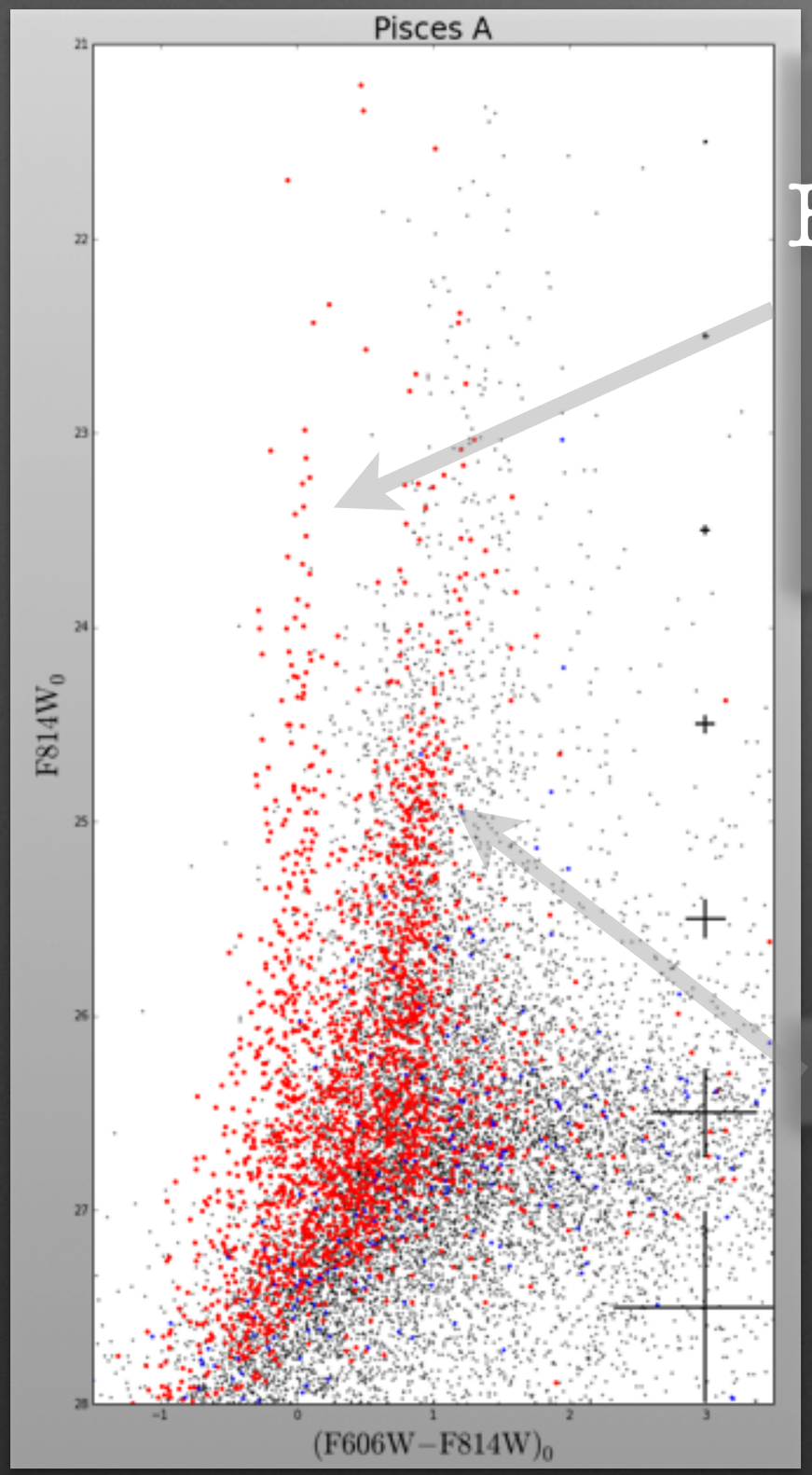

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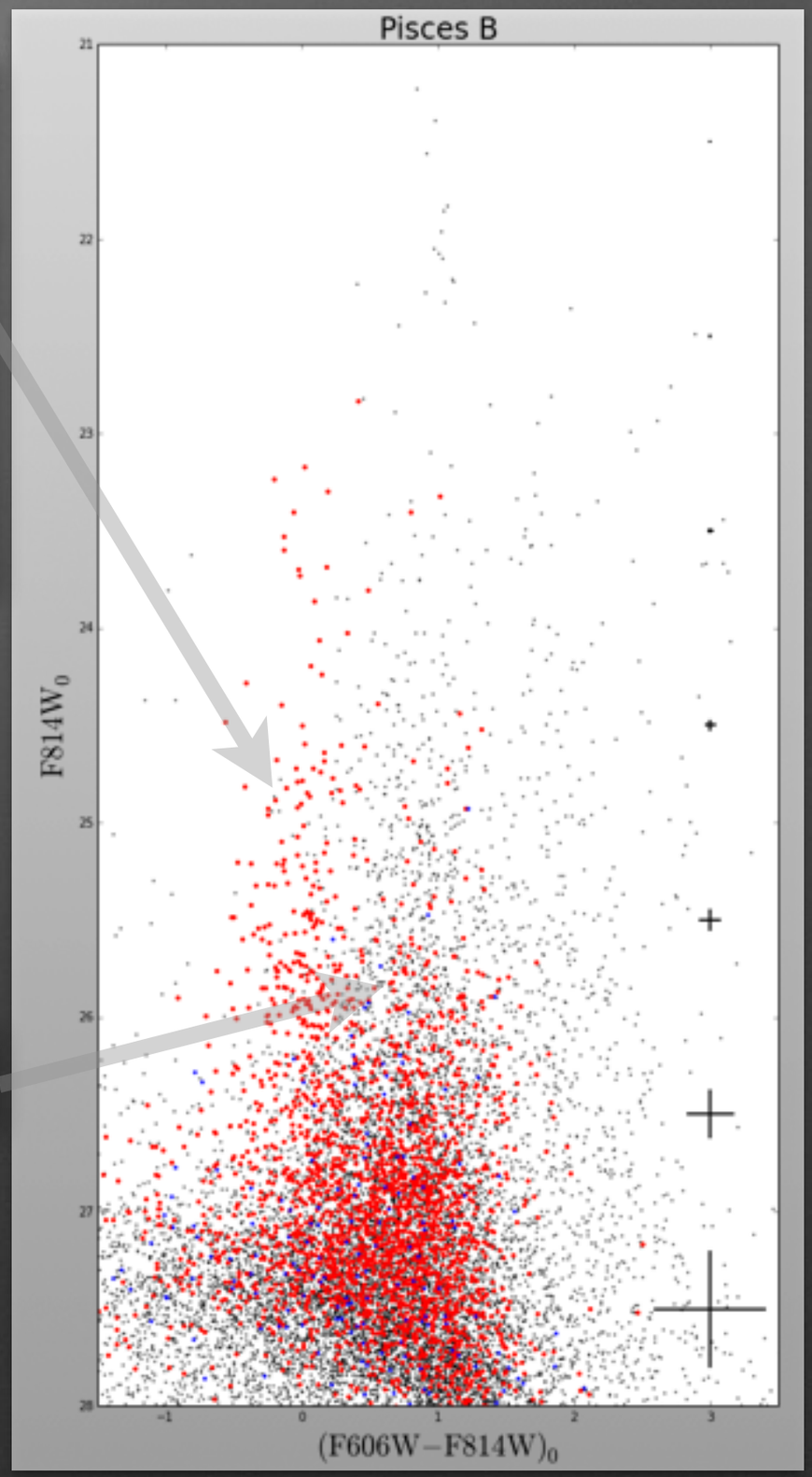
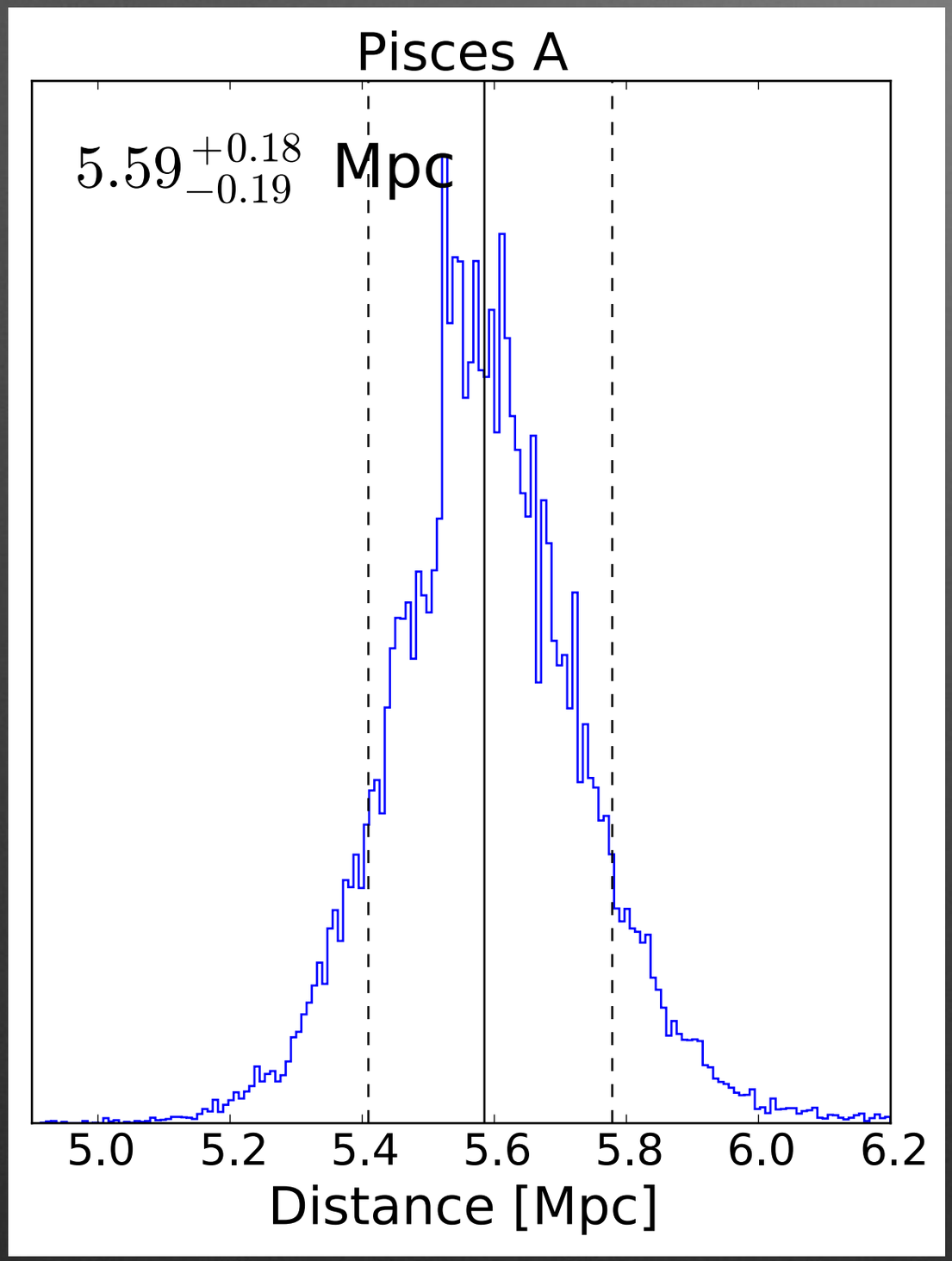
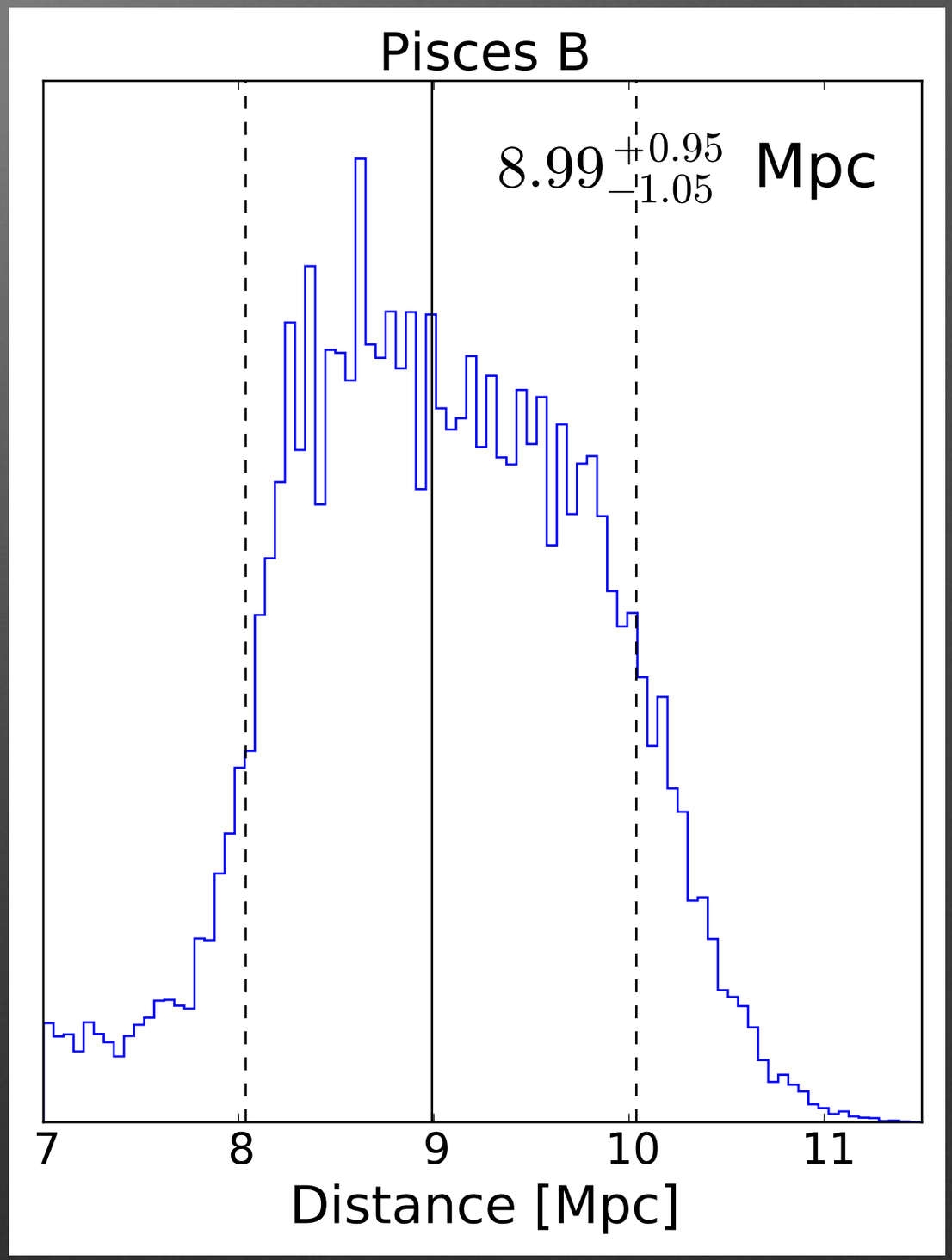
Clear RGB

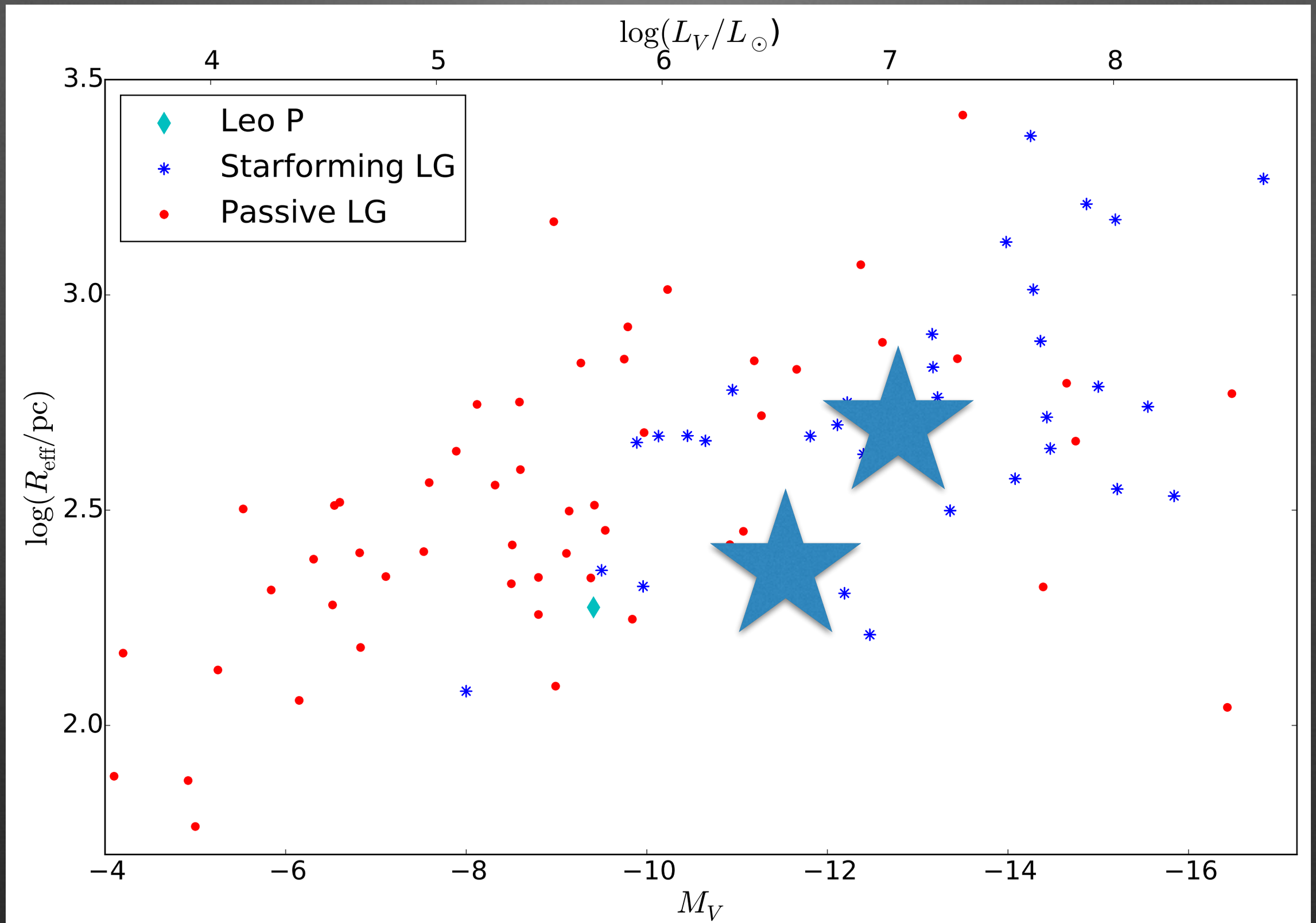


RGB yields distance

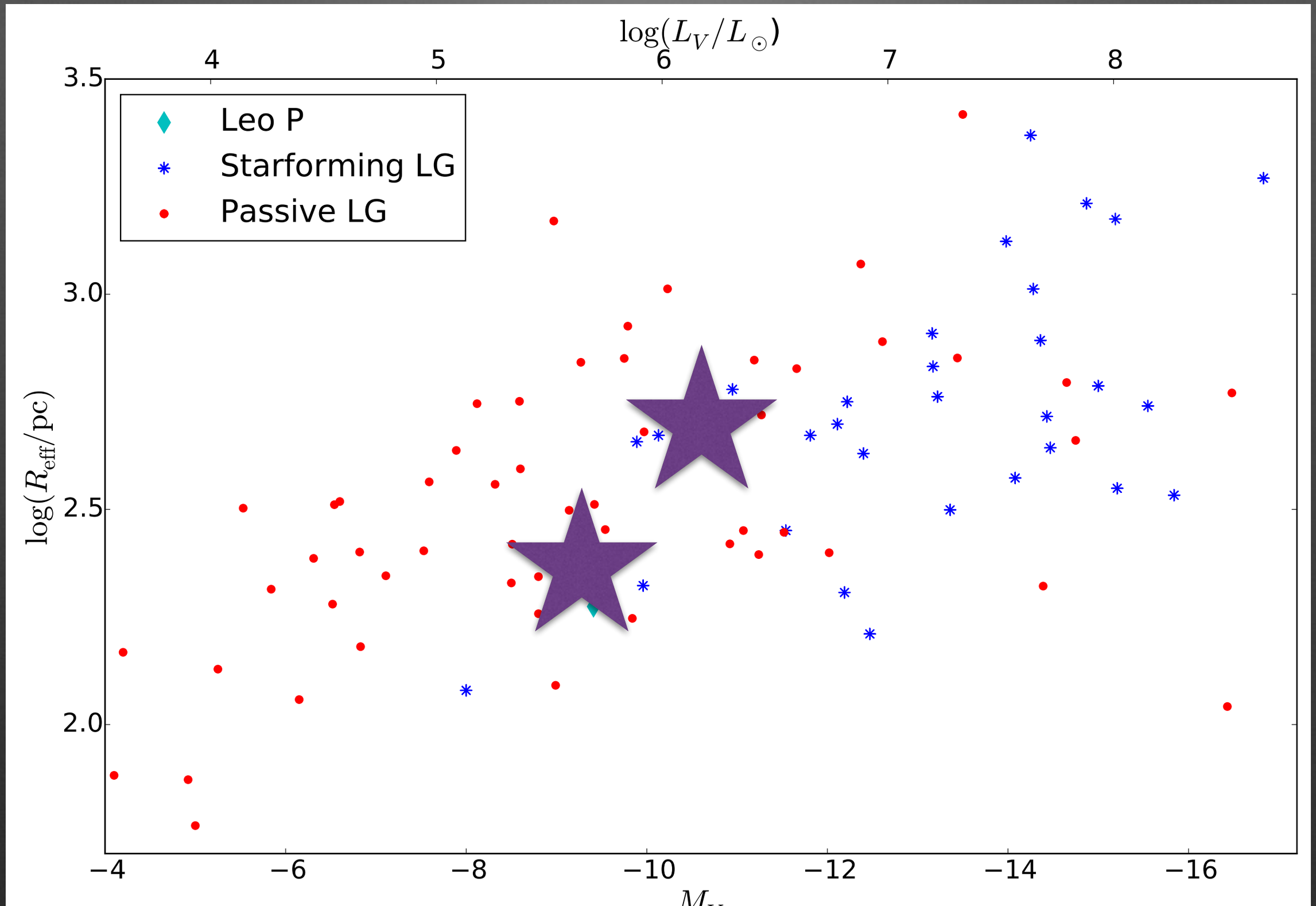




Resemble SF LG dwarfs

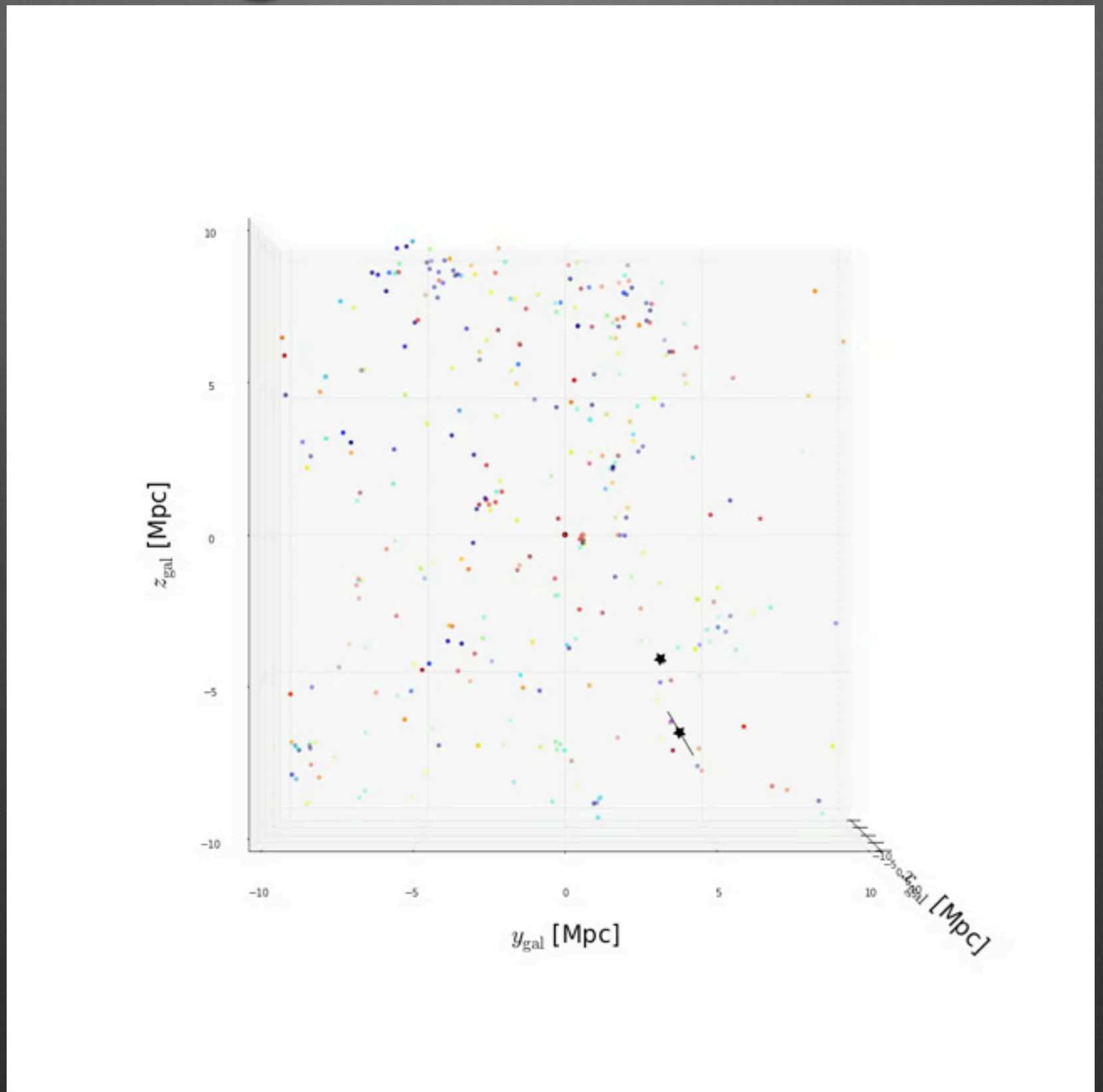


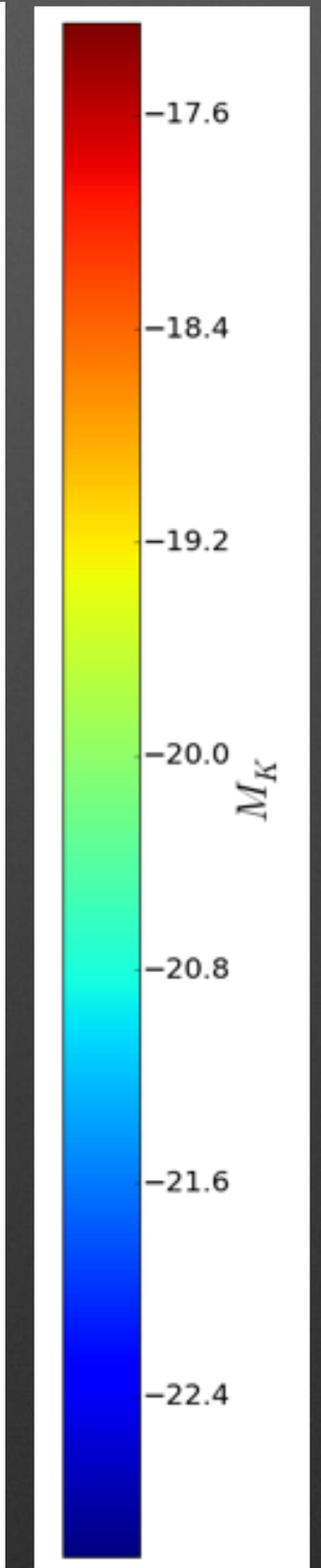
Faded to passive, ~LG dSphs



At the edge of filament/void

Voids➜ delayed evolution





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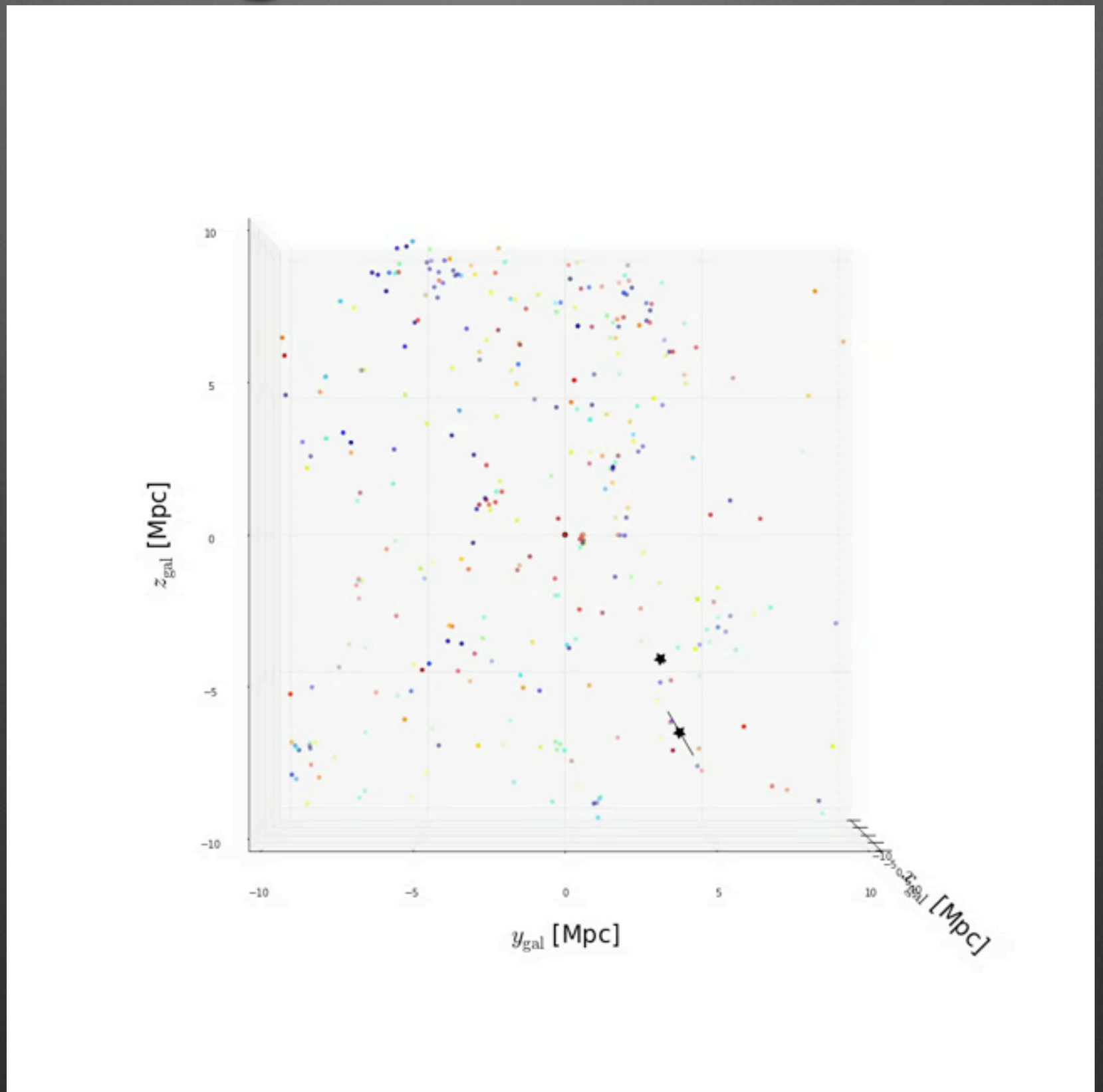
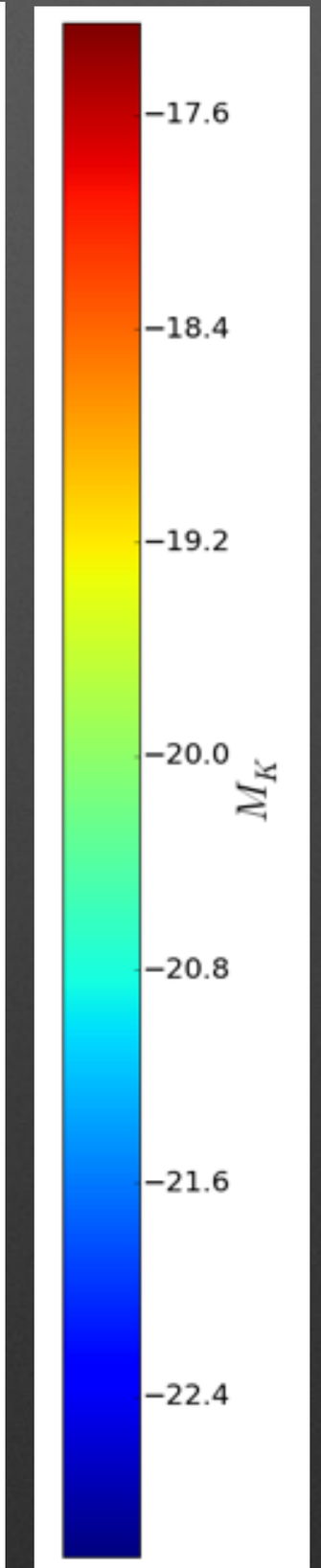
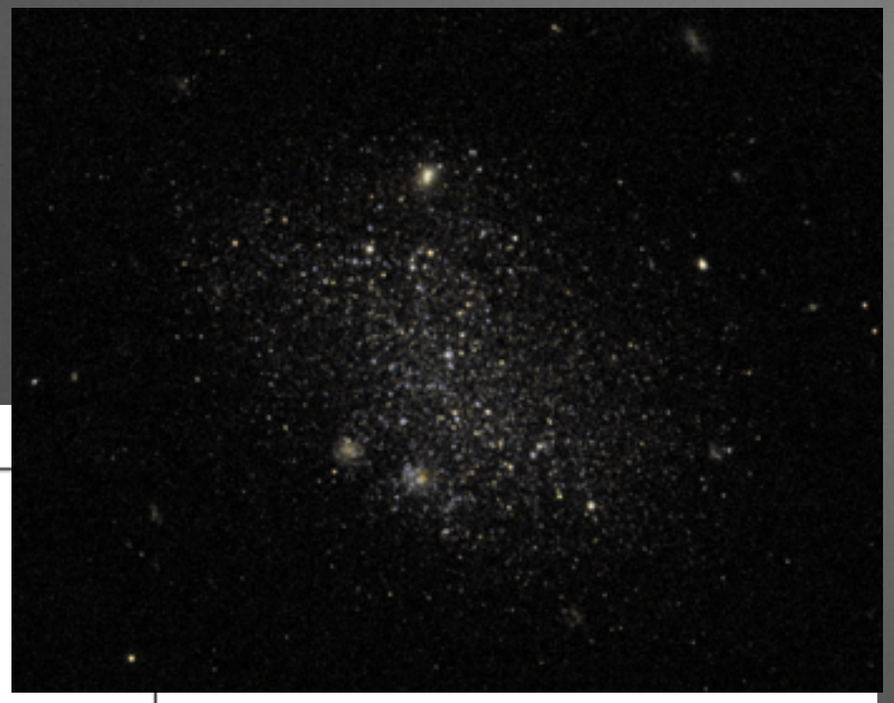
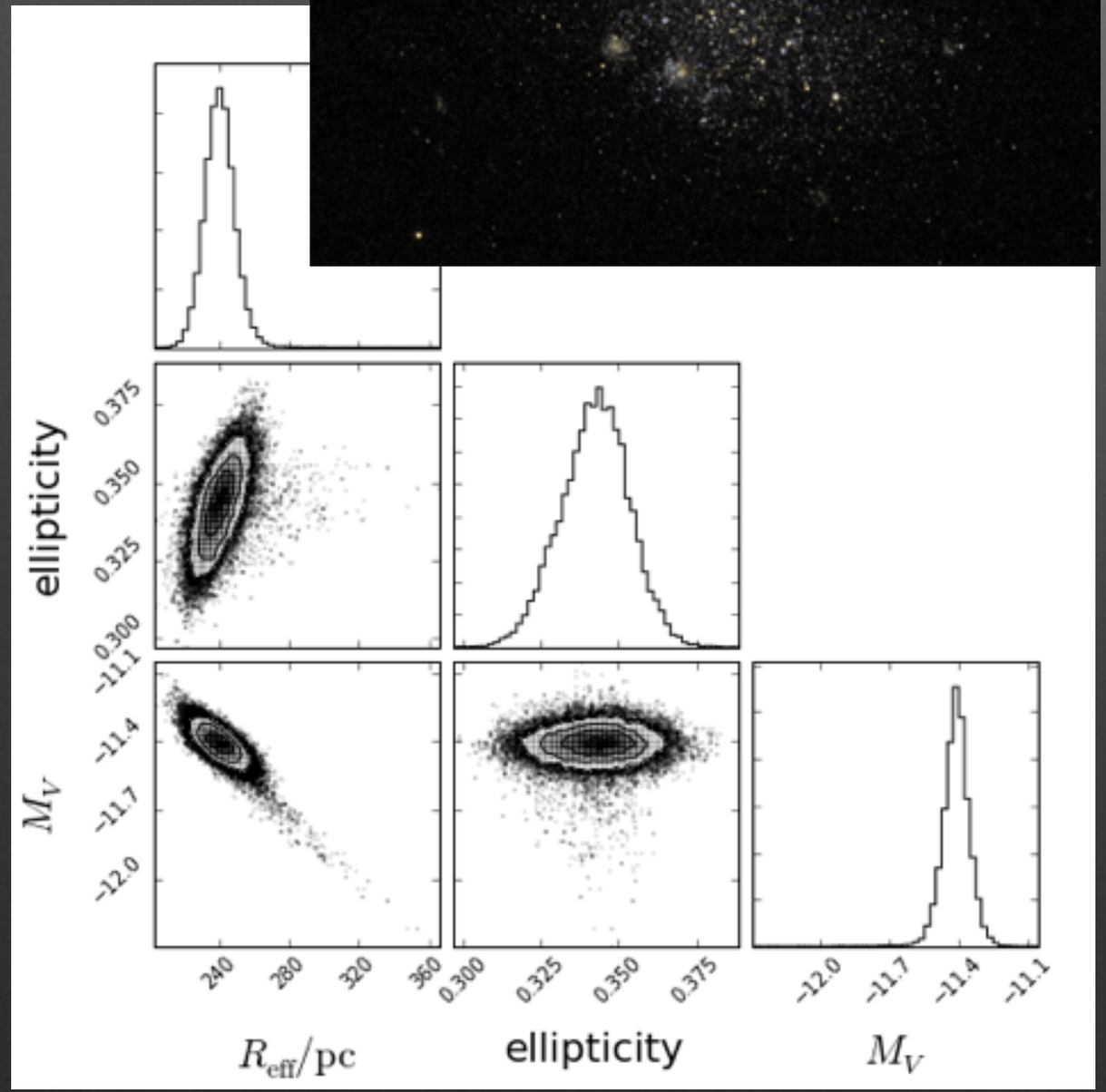
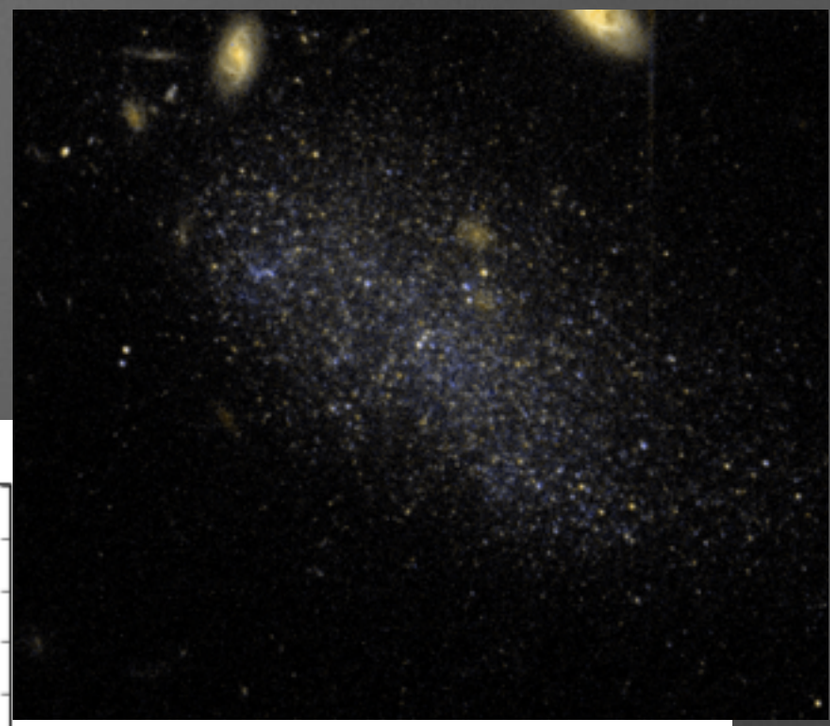


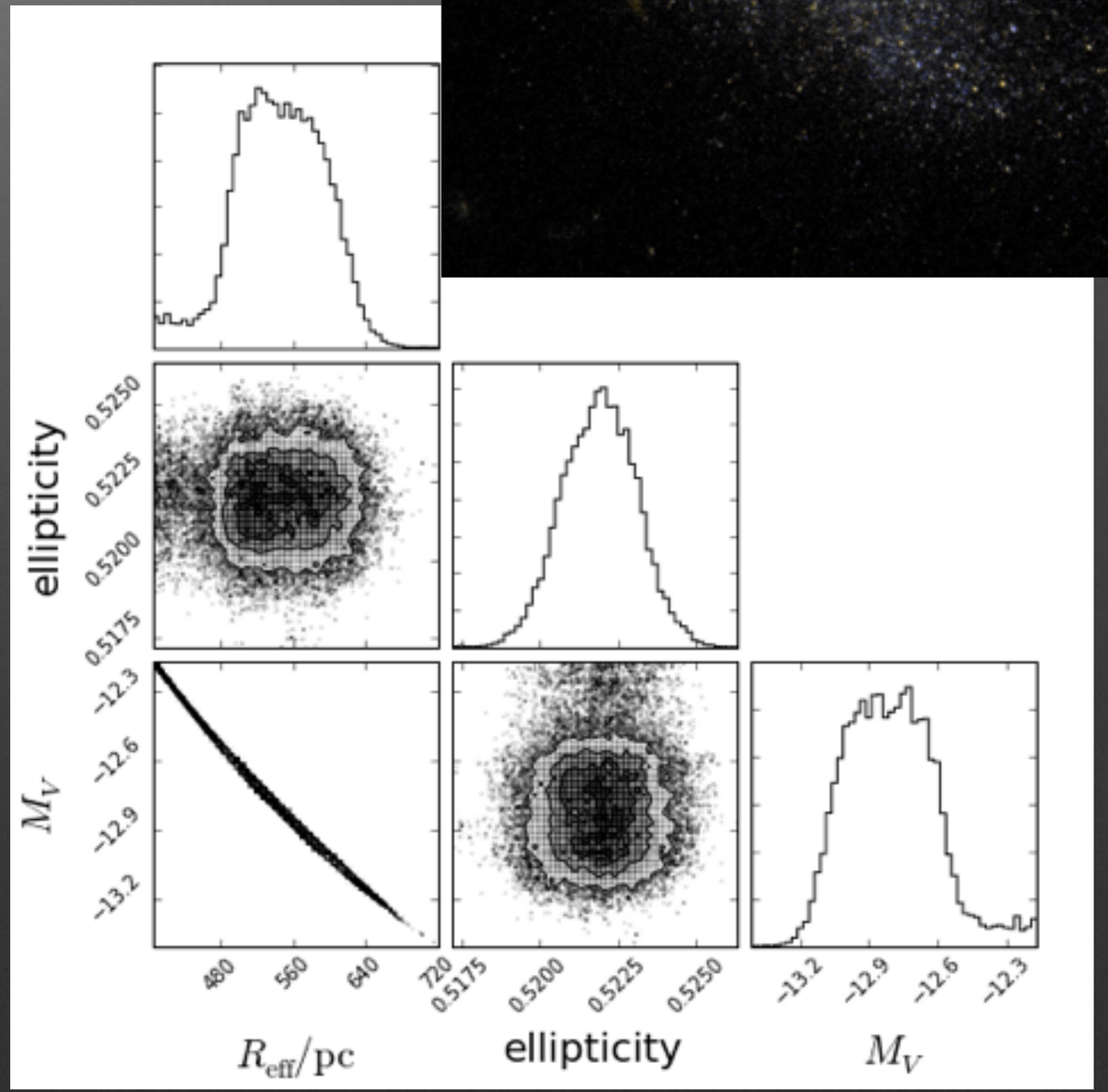


These may be the best ICs?









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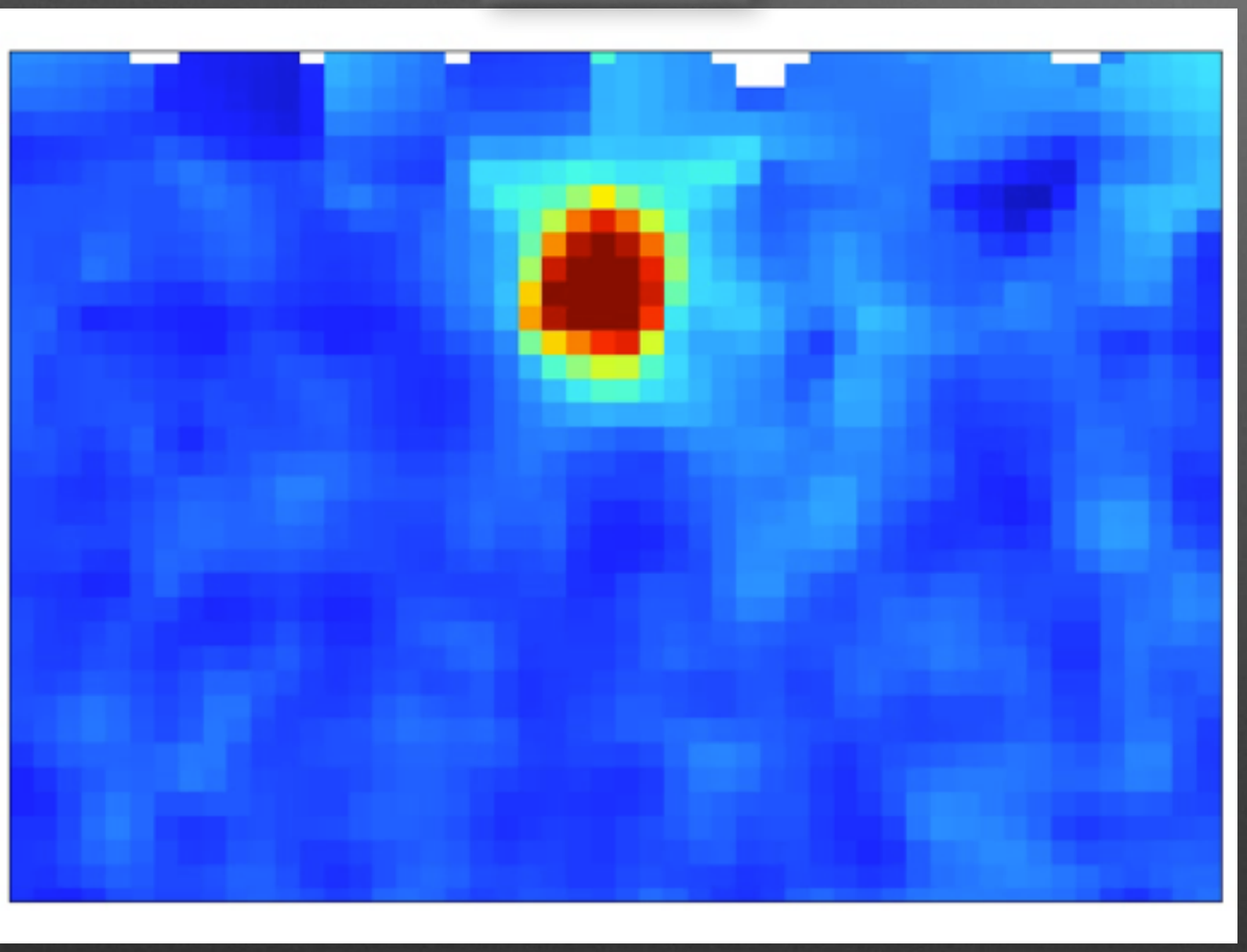
Leo T



Other Random Spot

So yes, but need to go beyond current HI search techniques

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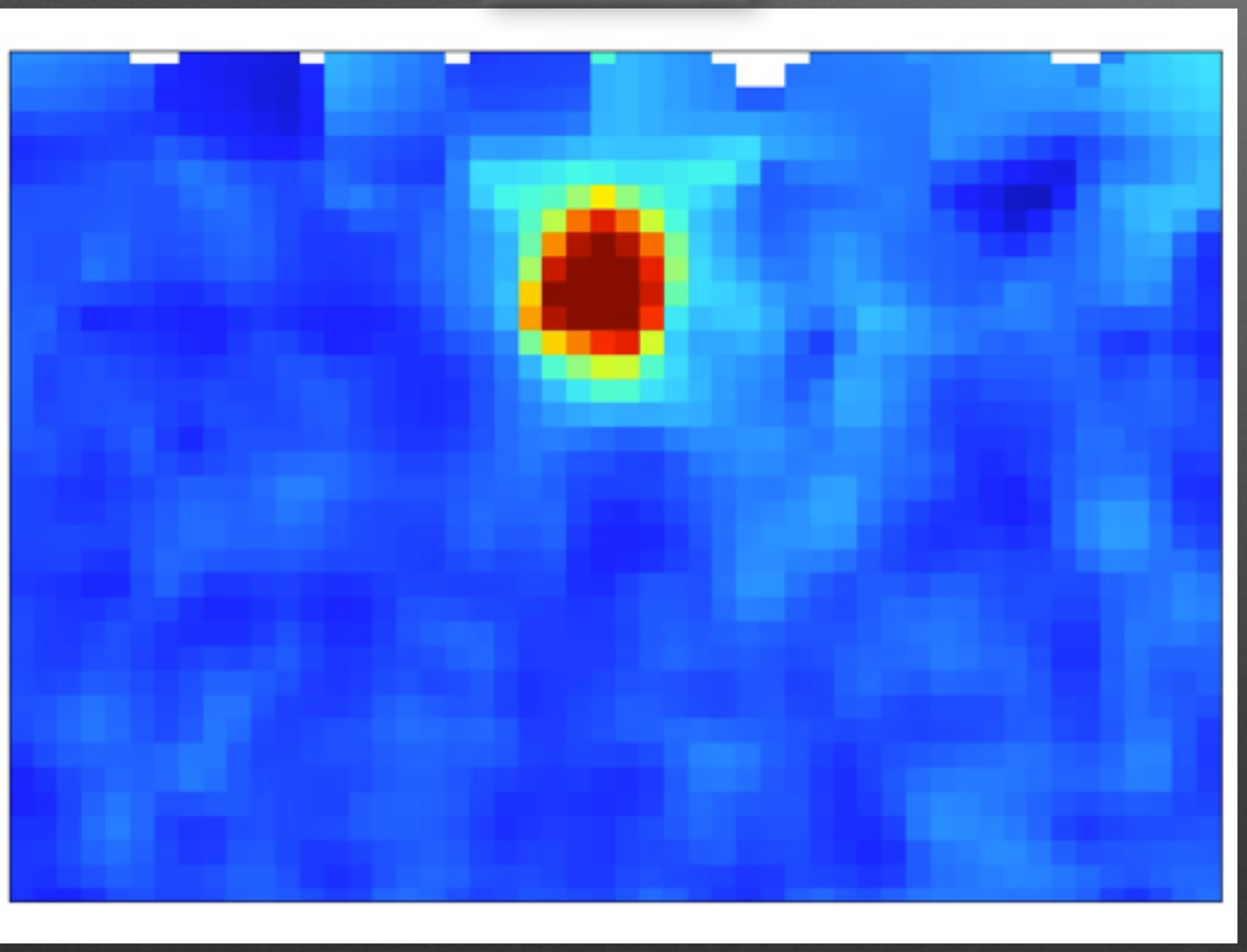

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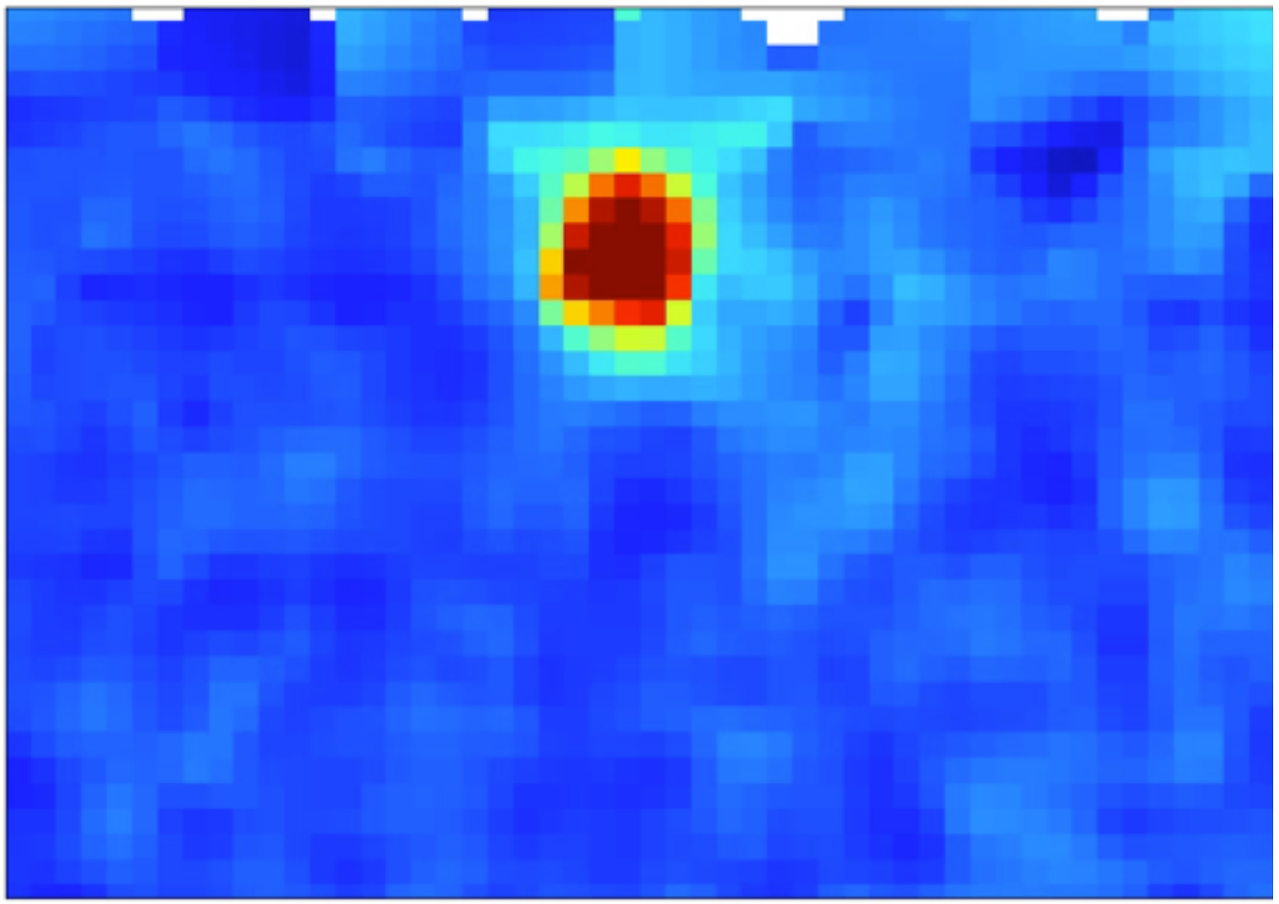

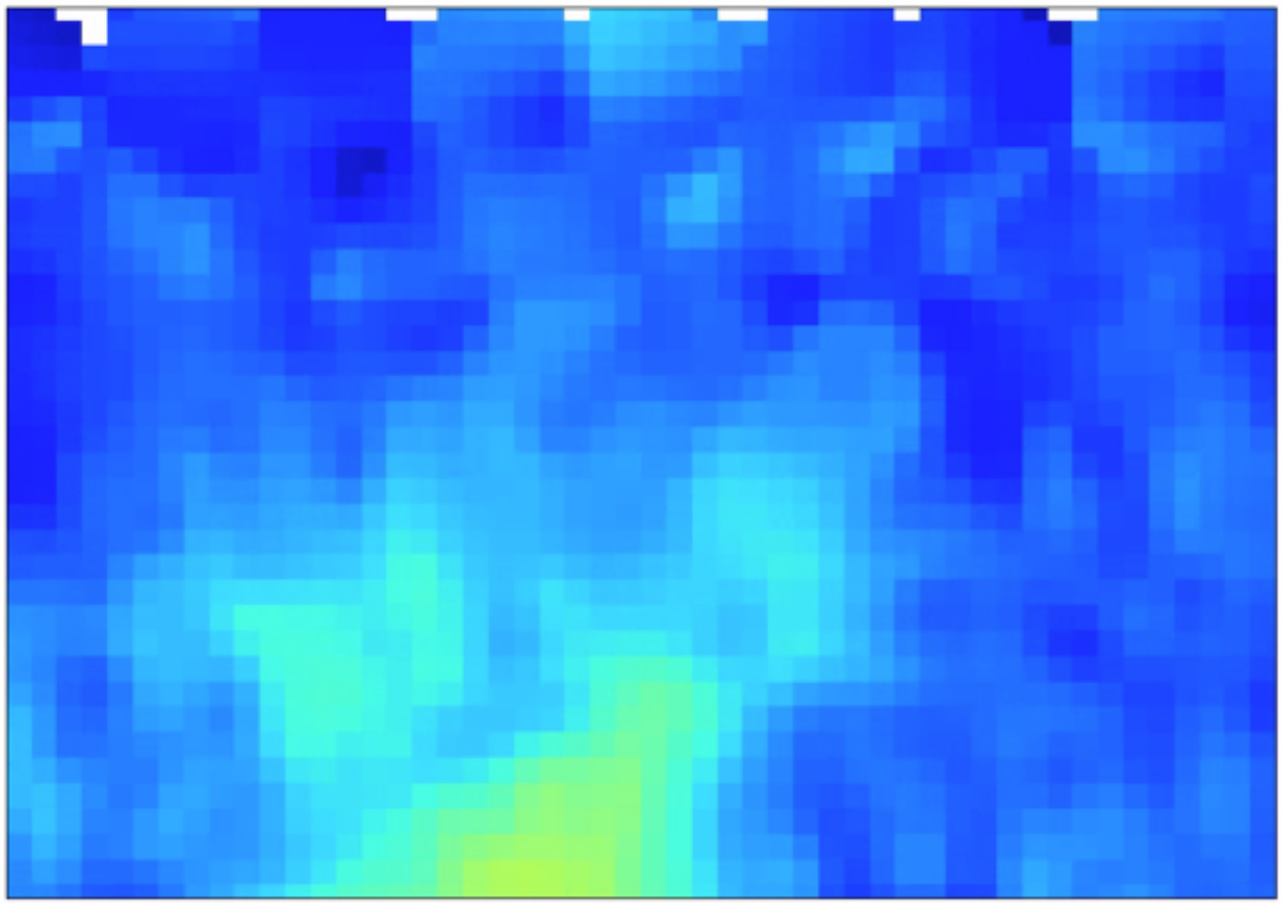

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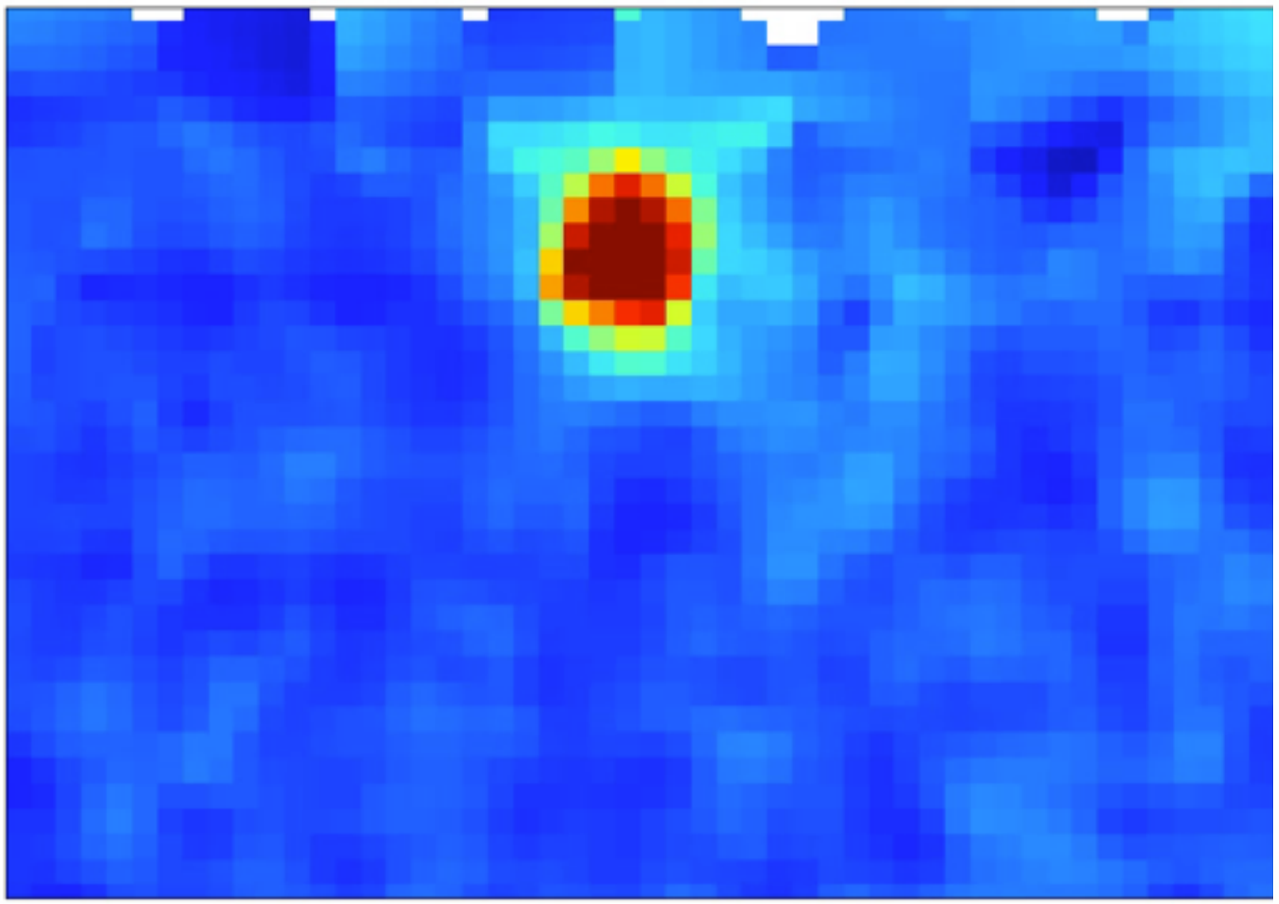

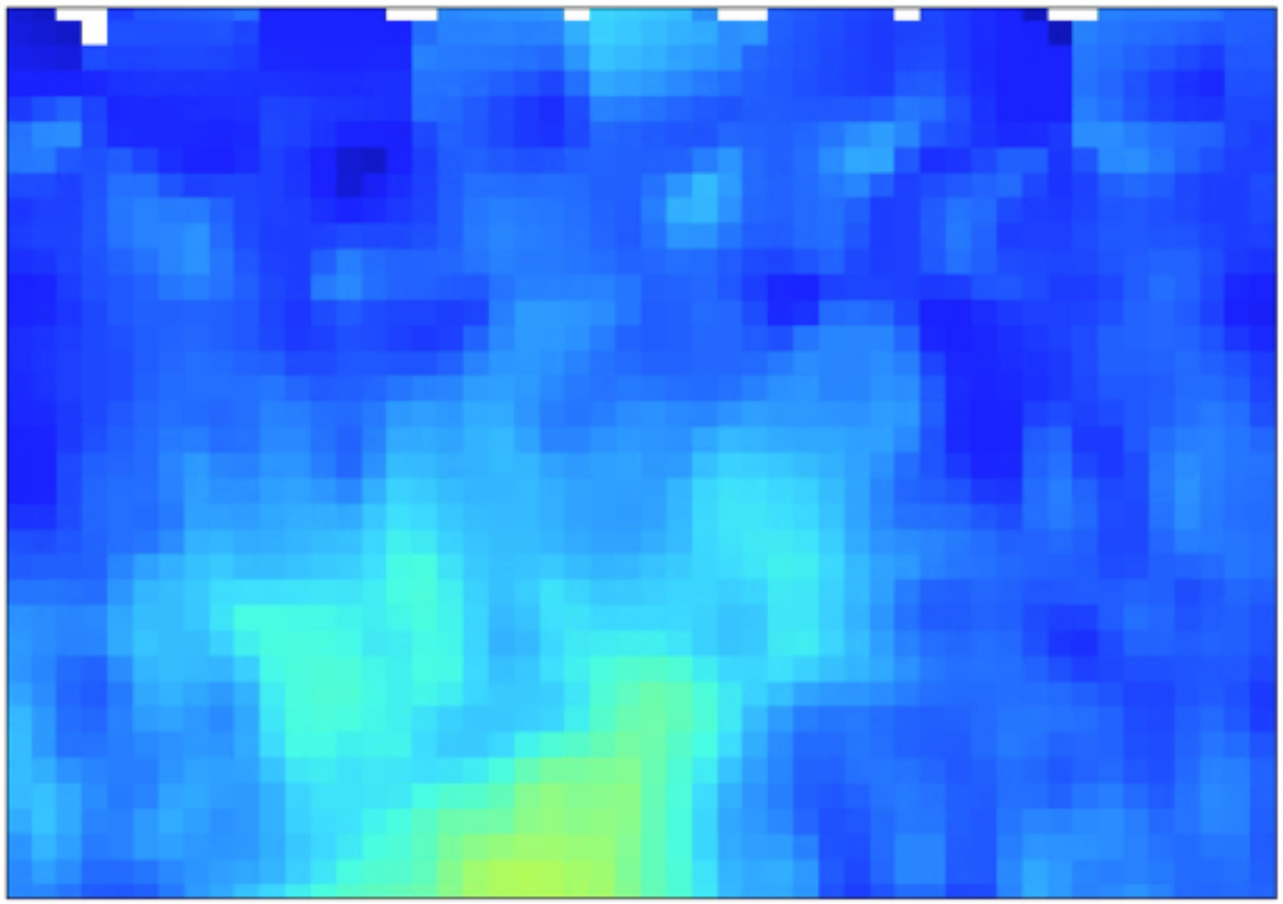

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Conclusions

- HI surveys can find dwarf galaxies comparable to Local Group satellites, but so far only in Local Volume
  - Such dwarfs provide context as possible progenitors of passive LG dwarfs
  - (Also begs the question: what are the HI clouds *without* optical counterparts?)
- Could be plenty more to be found, but need to separate from the Galactic foregrounds