A DEEPER look into MAIN-SEQUENCE and BLUE STRAGGLER stellar PULSATORS in EXTRAGALACTIC systems

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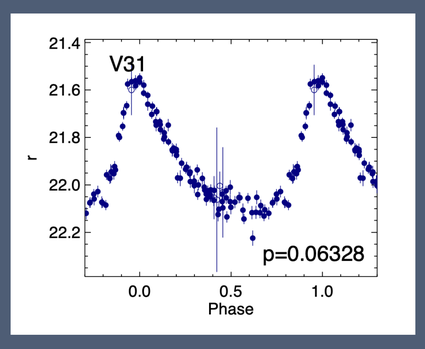
1 WHAT ARE THEY?

Delta Scuti (δ Sct) stars are pulsating variable stars located at the intersection of the instability strip and the main sequence, with periods from 0.008 to 0.42 days and amplitudes between 0.001 and 1.7 mag in the V-band.

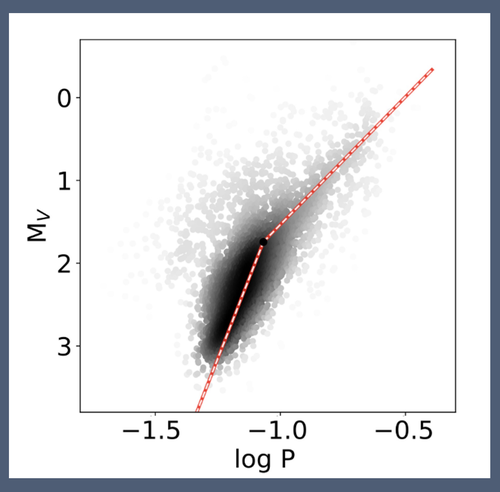


SCIENTIFIC BACKGROUND

These stars have been extensively studied in our Galaxy, but far less in extragalactic systems. In the Magellanic Clouds (MCs), the large variability surveys like OGLE and SuperMACHO have only scratched the surface of variability in dense star clusters given the difficulties posed by crowding at these distances, and the very short pulsation periods which require a large aperture telescope to get enough S/N with short exposure times.

5 PECULIAR PERIOD LUMINOSITY RELATION

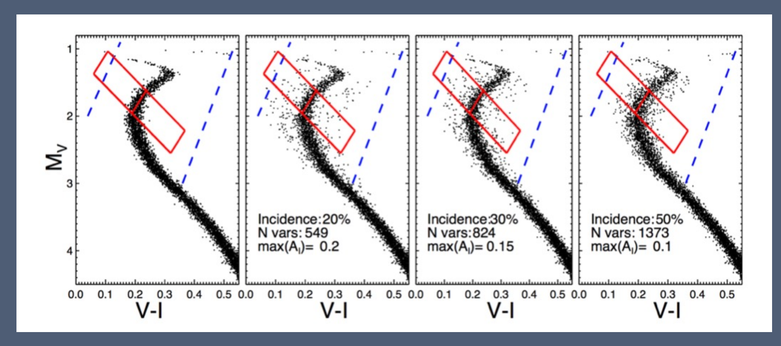
When investigating the period-luminosity relation of δ Sct stars in extragalactic systems, we unexpectedly find that such relation follow a broken power law (with a break at P ~ 2 hours) instead of simple linear relation (as seen in the Galactic δ Sct stars).



Possible causes that could cause this effect such as depth and geometry, metallicity, and pulsation modes have been discarded. Thus reinforcing the broken power law relation as real. **STAY TUNED, PAPER TO BE SUBMITTED SOON**

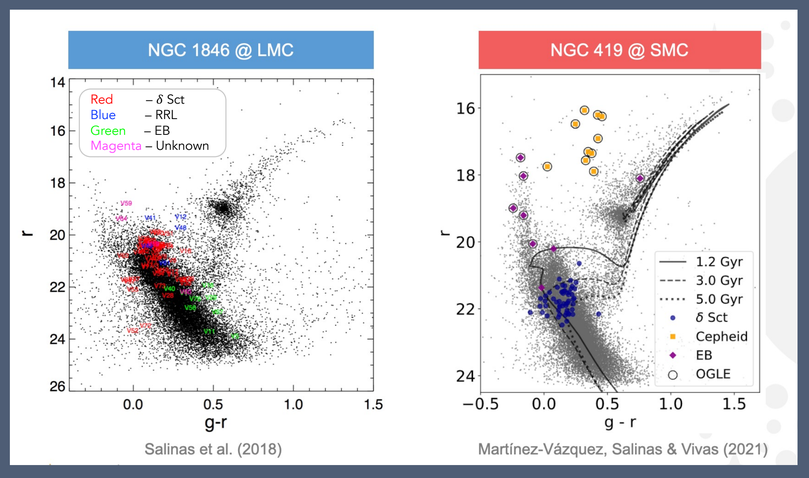
2 MOTIVATION

δ Sct stars near the main sequence turn-off (MSTO) may also play an unexpected role in the case of intermediate-age (1-3 Gyr) clusters in the MCs since they may be responsible, at least in part, for the extended or split MSTOs observed in some clusters (Salinas et al. 2016).



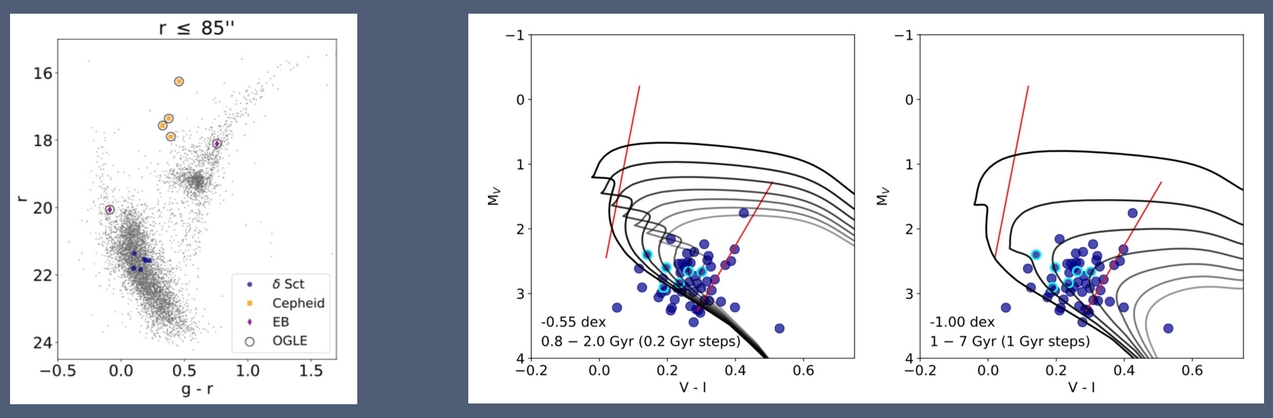
3 GMOS DATA

We observed the population of δ Sct variables in two intermediate-age globular clusters of the LMC and SMC using Gemini/GMOS time series collected trough Gemini FT.



4 RESULTS – extended MSTO and AGE

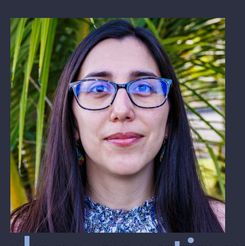
We find only a handful of δ Sct stars at the MSTO of NGC 419 (in contrast with those seen in NGC 1846, ~2 Gyr old) while the majority is fainter, indicating that the cluster is younger ($\lesssim$1.2 Gyr) than previously thought. We identify only six δ Sct stars as probable members of NGC 419 while the 48 remaining are likely δ Sct stars of the SMC field. Cluster δ Sct stars appear close to the red edge of the MSTO, supporting the idea that stellar rotation is not the only factor producing extended MSTOs, but also an age spread within the clusters.



6 CONCLUSIONS

We have made the largest detection of δ Sct stars in the SMC and in any star cluster (NGC 1846) thanks to the deep photometry obtained with Gemini/GMOS. From the δ Sct stars, we infer a younger age for NGC 419 ($\lesssim$1.2 Gyr). Finally, we notice that the period luminosity relation of the δ Sct stars in extragalactic systems seems to be explained by a broken power law rather than a linear relation.

References: Martínez-Vázquez et al. 2021, AJ, 161, 120; Salinas et al. 2016, ApJL, 832, L14; Salinas et al. 2018, AJ, 155, 183



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