The Limits of our Telescopes: The System NGC 5907

Context. The Low Surface Brightness regime is at the very limits of our telescopes. Objects in this regime are defined as those with magnitudes less than 28 mags/arcsec^2. Analysing objects in this regime requires long observations with powerful telescopes and even more careful reduction and analysis of resulting data. A recent tension has arisen around the low surface brightness feature around the edge-on galaxy NGC 5907. Striking amateur astronomer photographs of the galaxy show a large, double looped stellar stream surrounding it. However, recent observations using the Dragonfly Telephoto Array (observing down to 30.3 mags/arcsec^2) have been unable to recover the full feature, recovering only a single loop of the iconic stellar stream.

Aims. The aim of this project is use archival imaging from the Hyper Suprime-Cam (HSC) telescope of the Subaru Strategic Program to recover the iconic double loop stellar stream or to confirm the Dragonfly observations. We will also investigate if photographic plate imaging exists of NGC 5907, and if the double looped stellar stream can be found on these.

Methods. The student will have to conduct extensive data reduction and investigation of legacy HSC archival data, attempting to get down to 28 – 30 mag/arcsec^2. We will also apply novel source extraction techniques in an attempt to recover the stellar stream from the background noise of the HSC observations.

PLEASE NOTE. This project is dependent on a successful application to the Royal Astronomical Society (RAS) for funding of £1,200 (made by the supervisors of this project) for a six to eight week project which will be paid to the summer student. The project length and start date can also be decided by the summer student (though, must be in the summer term). Other funding will be sought after but cannot be guaranteed.

Students to Apply. This position is open to all physics students currently in the 2nd or 3rd year of their studies and will be students at the University in the next academic year. Python programming experience is preferred.

Deadlines. The deadline for applications is the 6th of February 2023. The successful applicant will receive confirmation by the 10th of February.