RESEARCH INTERESTS
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Throughut my career I have gravitated around three main topics AGN winds, Galactic Evolution in Protoclusters, and the dark halo on Galaxy clusters:

1 AGN winds and evolution

My focus has been to observe and characterize the winds that broad absorption lines (BAL) quasars show. In this line of work, I have many projects from my Ph.D. thesis, my first years of Postdoctoral work (e.g., Saez et al., 2009, 2011, 2012), and NuStar collaborations work (e.g., Luo et al., 2013, 2014). In 2013 I developed another collaboration that consisted of studying a large gravitationally lensed image separation ($\gtrsim 10''$) in quasar SDSS J1029+2623. The goal was to study the outflows in SDSS J1029+2623 through spectroscopic observations on at least two different lines of sights at the rest-frame of their images (multi-sightline spectroscopy). This collaboration with professor Toru Misawa ended up in a successful proposal with the VLT/UVES instrument and a paper (Misawa, Saez et al., 2016).
My last contribution to the understanding of AGN winds is an MNRAS submitted paper in which we study the connection that exists between the UV BAL winds and the X-ray emission. Our results suggest a connection between the mass/inclination of the wind and a weakening in the X-ray brightness in the central part of the quasar. The weakening in the X-ray region might be associated with a shielding area of the wind, and thus, we are getting a better understanding of the mechanism that might be producing these winds. This study was motivated by a successful multiwavelength *HST/Chandra* proposal to observe the BAL quasar PG 2112+059 (Saez et al., 2021, in prep).

2 Galactic Evolution in Protoclusters

In the latest five years of my career, I have broadened my field of study. One of my main interests is to understand better the connection of the evolution of quasars and galaxies in the big structures of the universe. In 2015, I finished a paper (Saez et al., 2015) that aims to establish spectroscopic classification with VLT-VIMOS, Keck-DEIMOS, Keck-LRIS of more than 300 sources in the field of the $z \approx 3.09$ protocluster SSA22. Last year I was able to collaborate on a paper (Monson et al., 2021, in prep) that is a continuation of our work with SSA22. In this paper, we found that the main source of enhanced AGN activity that SSA22 shows (Lehmer et al., 2009), should be produced by an enhancement of the mass of the protocluster galaxies when these are compared with field galaxies (galaxies that are not grouped in massive structures).

3 The dark halo on Galaxy clusters

As an undergraduate student at Universidad de Chile I became very interested in studying the dark halo of galaxy clusters through observational inferences. In particular, we were studying (with my undergrad supervisor; professor Luis Campusano) the occurrence of strong lensing in a sample of low redshift clusters ($z \lesssim 0.2$). The main objective at that time was to see if the clusters have a cutting redshift below there wont be any strong lensing effects. Through a semi-analytical dark halos model that was compared with VLT images, we were able to constrain the concentration of a sample of clusters (Saez et al., 2016). Our results were in agreement with what is expected from dark halo simulations. This project can be expanded in the future by checking the robustness of our approach by adding complexity in the model that we used to test the lensing statistics.

Recently with Professor Campusano and Victor Navarro, we performed a photometric search of clusters with weak lensing counterpart signatures. As a preliminary result, we found in this sample an apparent bimodality in the galaxy contents (and M/L) in the observed clusters. In our cluster sample, in addition to the typical clusters, we found an important fraction ($\sim 1/3$) containing dark galaxy haloes (high M/L).

References

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