

Protoplanetary disks in the Orion Nebula Cluster: a JWST-NIRCam photometric study

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Most stars (and thus planetary systems) form in clusters where massive stars also form. These massive stars are strong sources of UV photons, energetic enough to ionize, heat up and disperse the gas from the surrounding. Protoplanetary disks in the vicinity of massive stars thus experience external UV irradiation, that can drive major mass loss and affect the chemistry of the disk. NIRCam JWST has provided high angular resolution images of protoplanetary disks in the Orion Nebula Cluster (ONC), the closest example of star and planet formation in highly irradiated environment. Simultaneously, these observations unveiled the presence of candidates for binary system of planetary mass objects, coined JuMBOs for “Jupiter Mass Binary Objects”, whose nature is still in debate. Our objective is to assess the photometric properties of irradiated protoplanetary disks within the ONC, relate the properties to the physical parameters of those disks and the effect of photoevaporation, and to use these insights to assess the properties of JuMBOs. In this talk, I will present the analysis of the high angular resolution NIRCam images from the PDRs4All and GTO programs, from which we quantify the morphological and photometric properties of irradiated disks (in particular the disk radius). I will also present the results obtained for the JuMBOs observed by PDRs4All, and relate them to the protoplanetary disks, showing that -at least some- JuMBOs could be explained as low-mass binary stars with small (irradiated) disks. Future spectroscopic observations, first from JWST-NIRSpec and then from the Extremely Large Telescope will provide crucial information to confirm the presence of disks and to investigate their physical and chemical properties.