Revolutionary Quasar Science with *James Webb Space Telescope* Observations: Notice of Intent for JWST Director's Discretionary Early Release Science program

The two major sources off energy available to a galaxy are: nuclear fusion and the gravitational potential energy associated with a central super-massive black hole (SMBH). And, the link between massive galaxies and the super-massive black holes (SMBHs) that seem ubiquitous at their centers, is assumed to be vital to the understanding of galaxy formation and evolution. And, after dark matter, dust is the most mysterious component of galaxies.

As such, in this Notice of Intent (NoI), we outline 6 particular science cases that focus on the role of accreting supermassive black holes and active galactic nuclei central engines, and their direct consequences to galaxy formation and evolution at `Cosmic Dawn' and `Cosmic Noon'.

In particular, these science cases focus on:

— Active Black Holes in very high redshift (z>10) galaxies;

— Evidence for the Transition Mass that quenches AGN/quasar activity;

— What physical processes trigger luminous QSO activity at Cosmic Noon?

— Extremely Red Quasars, and placing them in an evolutionary context;

— Changing Look AGN and Quasars, and understanding SMBH accretion and central engines;

— Discovering of true Type 2 QSOs at high redshift.

The observational goals of the DD ERS program are to: (i) to perform a ~20 hour survey of Spitzer and WISE selected AGN and quasars; (ii) to test multiple modes of JWST, in particular MIRI, and (iii) to dovetail on the extragalactic deep field observations and produce timely and enhanced science and data products for the community.

In particular, and noting the PIs host institution, we aim to test multiple modes of the JWST MIRI including imaging, low-resolution slitted and slitless spectroscopy, medium-resolution integral field unit (IFU) spectroscopy and coronagraphy.