THE UNIVERSITY
OF EDINBURGH

Nicholas P. Ross, PhD

Institute for Astronomy
University of Edinburgh
Royal Observatory
Blackford Hill
Edinburgh EH9 3HJ, U.K.
`npross@roe.ac.uk`

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Dear Nature Astronomy,

Accretion disks are ubiquitous astrophysical systems, appearing as protoplanetary disks, Galactic X-ray Binary system and the active galactic nuclei of quasars. The accretion disks around supermassive black holes are seen as the key mechanism in transporting both mass and angular momentum.

The seminal paper by Shakura & Sunyaev (1973, A&A, 24, 337) laid out the physical mechanisms and developed the mathematics for accretion disks around stellar compact objects, i.e. black holes in binary systems. However, it was quickly realised that the physics could be scaled up to supermassive black holes, which are known to power quasars.

While both stellar X-ray binary systems and quasars were known to vary in their luminosity output (indeed, this was one major motivation to invoke a black hole plus accretion disk power source), the typical timescales involved for quasars were months to years, making detailed monitoring and observation hard.

However, with the recent advent of time-domain observational astronomy, and in particular combing both photometric monitoring and spectroscopic analyses, we are able to gain deep insights into accretion disk physics extragalactic sources. Indeed, these new data now deeply challenge the underlying "α-model" paradigm initially developed by Shakura & Sunyaev. This was noted in the recent article by Lawrence (2018, Nature Astronomy, Vol. 2, p.102) titled the "Quasar viscosity crisis".

Here, for the first time, we marry the detailed observations and a well-developed phenomenological model that explains the dramatic changes recently observed in quasar accretion disks. This is appropriate for publication in Nature Astronomy since it not only connects and tests underlying accretion disk theory with novel observations, but also makes strong predictions to how to interpret future time-domain observations of the variable extragalactic universe. Furthermore, as has been demonstrated by the recent Lawrence article, as well as the Collection in last month's edition, AGN and quasars remain pivotal for understanding galaxy evolution both observationally and theoretically.

We report on the quasar J1100-0053. The sister paper, Stern et al. (2018), reports on a second quasar J1052+1519, also identified as interesting due to its infrared properties, but showing changes in the broad emission lines, rather than the continuum and associated accretion disk. This paper was submitted to *The Astrophysical Journal* earlier this month.

We are not aware of any arising conflicts of interest, and if you require any further information, please do not hesitate to contact me. Thank you very much for your consideration.

Sincerely,

Nicholas P. Ross, PhD