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Data-driven galaxy-AGN co-evolution studies with eROSITA, Euclid and LSST

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Galaxy evolution follows the tapestry set by cosmology, but is modulated by central supermassive black holes. Human lifetimes limit the study of the stochastic gas motion from halos to the event horizon. Nevertheless, the last few decades have revealed a probabilistic multidimensional link between AGN outflows, black hole mass, accretion, galaxy mass, star-formation, morphology, and obscuration. Degeneracies linger in the demographic evolution of black holes and their radiative processes, which are important to resolve if we want to precisely understand the cosmic mass outflow budget affecting galaxies and the intergalactic medium. The millions of AGN found by new surveys (eROSITA, Euclid, LSST, SphereX, SDSS-V, DESI, 4MOST) will be able to break these degeneracies if selection effects are addressed with scalable inference methods. First results with *eROSITA* include abundant over-massive black holes at odds with their interpretation as seed remnants and tight correlations in current simulations.

References

<https://ui.adsabs.harvard.edu/abs/2024A%26A...692A.161B/abstract> <https://ui.adsabs.harvard.edu/abs/2024A%26A...689L...2B/abstract>
<https://ui.adsabs.harvard.edu/abs/2019ApJ...874..117B/abstract> <https://ui.adsabs.harvard.edu/abs/2015ApJ...802...89B/abstract>

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