

## The estimation of black-hole masses in distant radio galaxies

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### Abstract

We have estimated the masses of the central supermassive black holes of 2442 radio galaxies from a catalog. Mass estimates based on optical photometry and radio data are compared. Relationships between the mass of the central black hole  $M_{bh}$  and the redshift  $z_p$  are constructed for both wavelength ranges (radio and optic). Upper-envelope cubic regression fits are obtained using the maximum estimates of the black-hole masses. The optical and radio upper envelopes show similar behavior, and have very similar peaks in position,  $z_p \approx 1.9$  and amplitude,  $\log M_{bh} = 9.4$ . This is consistent with a model in which the growth of the supermassive black holes is self-regulating, with this redshift corresponding to the epoch when the accretion-ow phase begins to end and the nuclear activity falls off.

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