

Can reverberation-measured quasars be used for cosmology?

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Quasars have been proposed as a new class of standard candles such as Supernovae, their large redshift range and high luminosities make them excellent candidates. Reverberation mapping (RM) method offers to estimate the distance to the source from the time delay measurement of the emission lines with respect to the continuum, since the time delay depends on the absolute luminosity of the source. This radius-luminosity (RL) relation showed a low scatter and was proposed to use for the cosmological purposes. However, in the recent years the increase of the studied sample, and in particular the inclusion of highly accreting QSO has increased the dispersion in the RL relation, with many objects showing time delays shorter than the expected. Using H β RM measurements for 117 sources with a $0.2 < z < 0.9$ and $41.5 < L_{5100} < 45.9$, we find a correction for the time delay based on the dimensionless accretion rate. With this correction we are able to build a Hubble diagram, which is in a good agreement with the standard cosmological model. On the other hand, using the excess of variability, we find that departure from the RL relation is associated with the variability. Therefore variability is anti-correlated with the accretion rate, indicating that accretion rate is one of main drivers of QSO properties. Large multi-epoch surveys like LSST will be provide variability features, which can be used as a tool in order to derive other AGN physical properties.

Primary author(s) : Dr MARTÍNEZ-ALDAMA, Mary Loli (CFT); Prof. BOZENA, Czerny (CFT)

Presenter(s) : Dr MARTÍNEZ-ALDAMA, Mary Loli (CFT)

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