Contribution ID: **39** Type: **Talk**

The X-ray properties of z~6 quasars

Friday, 12 October 2018 10:45 (15 minutes)

More than 200 quasars (QSOs) with spectroscopic redshift z > 6 have been discovered so far.
Multi-wavelength observations showed that these QSOs are evolved systems with large black hole masses (10^{8-10} $M_{\odot}$), and their broad-band spectral energy distributions (SEDs) and rest-frame NIR/optical/UV spectra have not significantly evolved over cosmic time.
The formation of their Super Massive Black Holes in less than 1 Gyr is still a challenge for theory, with many simulations claiming they formed at the center of primordial overdense regions.
I report the study of all the 29 z∼6 QSOs observed so far with X-rays, in which our group concluded that the X-ray spectral properties of high-z QSOs do not differ significantly from those of QSOs at lower-z.
We also obtained a deep 500 ks Chandra observation to study the environment around the QSO J1030+0524, which shows the best evidence of an overdense region around a z∼6 QSO. This is the deepest X-ray observation ever achieved for a z∼6 QSO. Comparing our results with those from previous XMM observation we found a hardening of the X-ray spectrum and a decrease of the flux by a factor 2.5. This is the first evidence of a variable QSO at such high redshift. I also report the discovery of a diffuse X-ray emission southward the QSO, that could be linked to the feedback of the AGN.

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Session Classification: Cosmology and High-redshift