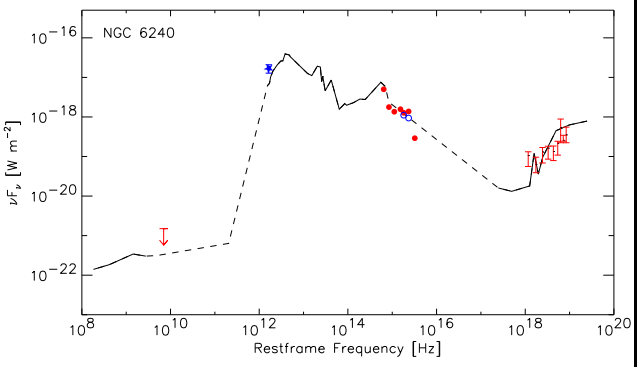
Sub-mm detection of a high-z Type 2 QSO

- **We report on the first SCUBA detection of a Type 2 QSO at z=3.660 in the Chandra Deep Field South.**
- **The overall photometry (from the radio to the X-ray band) of this source is well reproduced by the SED of NGC6240.**
- **Its sub-mm (850 μm) to X-ray (2 keV) spectral slope ($\alpha_{\rm SX}$) is close to the predicted value for a Compton-thick AGN in which only 1% of the nuclear emission emerges through scattering.**
- **We derive a SFR=550–680 $M_\odot$/yr and an estimate of the dust mass, $M_{\rm dust} = 4.2 \times 10^8\ M_\odot$.**

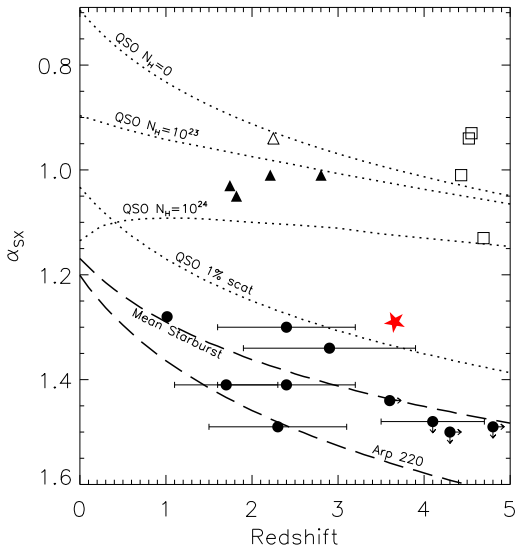
Spectral energy distribution



Detections and upper limits for CDFS-263 plotted over the SED of NGC 6240. The solid line shows where the photometry is available while the dashed line is where the template is extrapolated. The CDFS-263 data have been shifted to the rest frame. The star symbol shows the measured SCUBA flux.

CDFS-263 is a strong candidate for an AGN in the initial phase (before the "X-ray absorbed phase") described by Page et al. (2004) that corresponds to the main growth period of the host galaxy spheroid. It is a luminous X-ray source ($L_X > 10^{44}$ erg s^{-1}) with high X-ray absorption ($N_H > 10^{23}$ cm^{-2}) and detected in the sub-mm, $S_{850} = 4.8 \pm 1.1$ mJy.

Sub-mm to X-ray spectral flux



CDFS-263 yields a value of $\alpha_{\rm SX} = 1.29$ (star symbol). This value is incompatible with an unabsorbed AGN. One way to obtain this value of $\alpha_{\rm SX}$ is a sub-mm flux due to starburst activity plus an absorbed AGN in the center of the host galaxy that accounts for the X-ray emission, which is higher than what expected for a starburst galaxy alone.
For comparison we report in the figure other X-ray selected sources with sub-mm data measurements from the literature: Alexander et al. (2003) (circles); Page et al. (2001) (filles triangles); Page et al. (2004) (empty triangles).

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