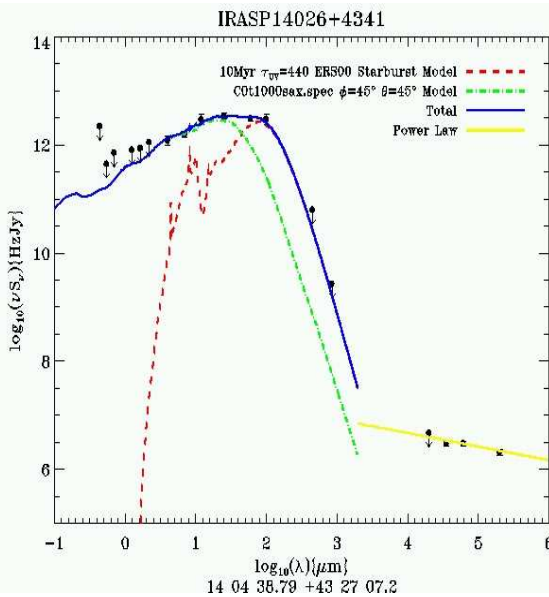
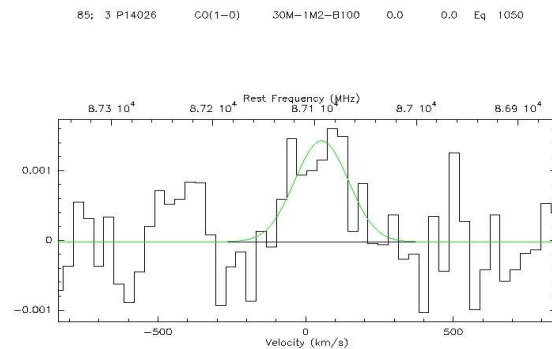




Hyperluminous infrared galaxies (HyLIGs) are the most extreme members of the infrared galaxy population ($L > 10^{13} L_{\odot}$) and have luminosities that are amongst the highest measured in the Universe, second only to powerful gamma-ray bursts. They show evidence of harbouring coeval AGN and starbursts and have disturbed morphologies. Yet, their evolutionary role, their connection to the well studied ultraluminous galaxies (ULIGs), to starbursts and AGN remain uncertain. I summarise the first results⁹ from our IRAM 30m program to investigate the molecular gas content of an unbiased sample of HyLIGs for which little is currently known. We investigate the presence and quantity of molecular material and how this may relate to obscured star formation and an active nucleus.

Gas in IRAS 14026+4341 IRAS 14026+4341 is a radio-quiet, low-ionisation broad-absorption line (BAL) QSO¹ harboured within an elliptical-like host which is interacting with a small companion². The figure to the right shows the weak (3σ detection) of the CO(1 \rightarrow 0) transition very close to the optical redshift ($z=0.323$). After fitting the line with a single Gaussian and applying the conversion factor between CO luminosity and mass of H₂³ we derive a molecular gas mass of $9.74 \times 10^9 h_{65}^{-2} M_{\odot}$ similar to those determined for ULIGs⁴.



Dust in IRAS 14026+4341 The figure to the left shows the compiled optical-mm SED for this galaxy modelled using detailed radiative transfer models of starbursts and dusty tori. We find coeval starburst and AGN activity where the AGN dominates (64%) of the IR luminosity. Interestingly the best-fit AGN model is inclined at to the line-of-sight by 45° with a 90° opening angle indicating the emission grazes the surface of the obscuring torus. This independently derived result, as well as being consistent with the steep radio spectral index ($\alpha=0.8$), is also consistent with the 'orientation' models proposed for BALQSOs^{e.g.5,6,7}. The resulting gas-to-dust ratio, that is an evolutionary indicator of the mass of gas yet to be turned into stars, is ~ 30 . The value is consistent with previous measurements of high-z QSOs⁸ but lower than the canonically expected value.

Summary A multiwavelength comparison of optical, infrared, (sub-)mm, and radio data for IRAS 14026+4341 yields a consistent result of a strong AGN and coeval starburst activity with a modest amount of molecular gas. At the current star formation rate, our derived gas content will be depleted in ~ 10 Myr. The low gas-to-dust mass ratio suggests that IRAS P14026+4341 is a complex QSO+starburst system where star-formation is at more advanced stage than gas-rich starbursts or ULIGs.

¹Low et al. 1989; ²Hutchings & Morris 1995; ³Solomon et al. 1997; ⁴Downes & Solomon 1998; ⁵Schmidt & Hines 1999; ⁶Reichard et al. 2003; ⁷Hewett & Foltz 2003; ⁸Cox, Omont et al.; ⁹Verma et al. in prep.