The Polar Disc in NGC 2768: CO, HI + optical IFU observations

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The polar disc

- CO (PdB interferometer)
- ~400 pc in radius
- $6.4 \times 10^7 M_{\text{sun}}$ of molecular gas
- ionised gas (SAURON)
- related dust structure

CO(2-1) intensity

CO(2-1) velocity

CO(1-0) intensity

dust

Ionised gas velocity
Origin of the Cold Gas

HI contours (white) over DSS image

CO(1-0) contours over dust map

-asymmetric in HI, dust and CO- all stronger to the north/northeast: can follow accretion from 30 kpc (HI) to inner 1 kpc (CO)

(Morganti et al. 2006)
Star Formation (?)

- no coincident increase in Hβ linestrength
- OIII/Hβ ratio not low enough to be definitely star forming
- but sigma drop is present - from a young, dynamically cold population???

Star formation is not clear, but possible.
Conclusions for NGC 2768

- Small polar molecular disk
- External origin
- Possible star formation
- (see Crocker et al. 2008 for more details...)

And more general Questions...

- Absent or just hidden star formation?
- Are classic star formation tracers valid in early types?
- Can molecular gas be stable?
Star Formation Indicators: E/S0s vs. spirals

1. $L(\text{FIR})/M(\text{H}_2)$
   - not very different from spirals
   - if $L(\text{FIR})$ accurately traces SFR, this implies normal star formation efficiency from a unit mass of cold gas

Devereux & Hameed 1997
2. $L(\text{FIR})/L(1.4 \text{ GHz})$

- measured by $q = \log(S(\text{FIR}) - S(1.4\text{GHz}))$
- two to the left are radio AGN
- others all seem to be FIR-excess... why?
- Yun et al. 2001 note that weaker FIR galaxies ($L(\text{FIR}) < 10^9 L_{\text{sun}}$) tend to have higher $q$ values
- dust-enshrouded AGN?
3. L(FIR)/L(H$\beta$)

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