

# 30 Years of Photodissociation Regions:

A symposium to honor David Hollenbach's lifetime in science  
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## **CH<sup>+</sup>(*J*=1-0) line detection in a high-*z* ultra-luminous galaxy, SDP17b: the first probe of a massive turbulent halo**

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We illustrate the power of CH<sup>+</sup> spectroscopy at high spectral resolution with the first detection by ALMA of a CH<sup>+</sup> (*J*=1-0) line in an hyper-luminous galaxy, SDP17b at *z* = 2.3. It is a weakly lensed galaxy (*μ* = 3.56) of intrinsic FIR luminosity  $L_{FIR} = 2.07 \times 10^{13} L_{\odot}$ , implying an extreme star formation rate  $SFR = 2325 M_{\odot} \text{ yr}^{-1}$  (Negrello et al. 2014). Unlike other molecular tracers, the unique chemical and spectroscopic properties of the CH<sup>+</sup> cation make it a tracer of the turbulent energy trail, from its scale of injection to that of dissipation at which CH<sup>+</sup> forms (Godard et al. 2014). In SDP17b, CH<sup>+</sup>(1-0) absorption is detected against the dust continuum and a broad emission line. The absorption probes a massive turbulent halo of low density and the emission possibly originates in a large number of irradiated low-velocity shocks.

## REFERENCES

Godard, B., Falgarone, E. and Pineau des Forêts, G. (2014) A&A, 570, A27  
Negrello, M., Hopwood, R., Dye, S. et al. (2014) MNRAS, 440, 1999