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Similarity and randomness in the molecular clouds associated with Spitzer GLIMPSE Extended Green Objects (EGOs)

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Abstract. EGOs are candidates of massive star forming regions that show signatures of outflows. A 1.1mm line survey has been performed to 89 EGOs using the AROSMT. Our high detection rates of $H^{13}CO^+$ 3-2 and SiO 6-5 lines support EGOs to be dense clouds harboring outflows.

Ubiquitous line luminosity linear correlations are found among different kinds of tracer lines: dense gas tracer $H^{13}CO^+$ 3-2, outflow tracer SiO 6-5, mixed dense gas and outflow tracers $SO^3\Sigma\, 6_5 - 5_4$ and CH_3OH lines, and relatively lower density gas tracers ^{12}CO, ^{13}CO, $C^{18}O$ 1-0 (**see an example** in Fig. 1). This can be explained if a universal similarity of density and thermal structures and probably of shock properties among all these EGO clouds are assumed. Furthermore, the outflow shocks are also required to be produced mainly inside of the natal clouds of the YSOs.

The data scatter of the luminosity (and line width) correlations show a clear trend of worsening across larger cloud substructure size scales or toward larger cloud sizes, which demonstrates the growth of randomness in cloud structures and velocity fields. See more details in our paper (He *et al.* 2012).

Keywords. turbulence — stars: formation — ISM: clouds — ISM: jets and outflows — ISM: kinematics and dynamics — radio lines: ISM

References

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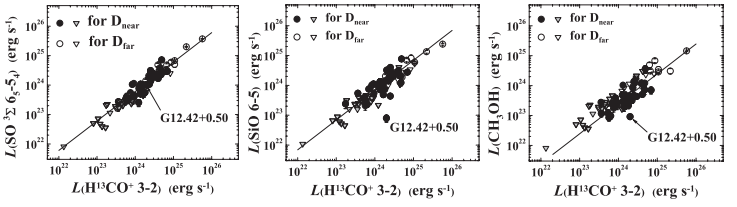

Figure 1. An example of the ubiquitous log-linear correlations among all observed line luminosities: the correlations among the dense gas and shock trackers. Upper limits are shown in triangles, and far distance quantities in open circles. The exceptionally weak SiO and CH_3OH lines of G12.42+0.50 have been excluded from the log-linear fitting (straight lines). All the fitted lines have a slope of unity in log scales and thus also represent linear correlations.