Herschel Hydride Observations
of Star-Forming Regions

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1. Goals

- Survey hydrides of most abundant elements and ionized hydrides: OH, OH^+, CH, CH^+, NH, NH^+, SH, SH^+, H_2O, H_2O^+, and H_3O^+
- Concentrate on water chemical network
- Study effects of X-rays and FUV fields from protostars

2. Observations

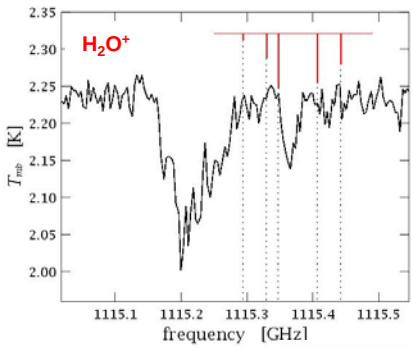


Fig.1: Ionized water observed in W3 IRS5. The position and strength of fine structure lines indicated in red, shifted by systemic velocity.

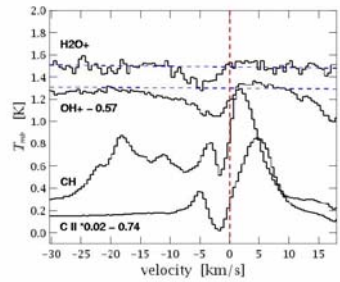
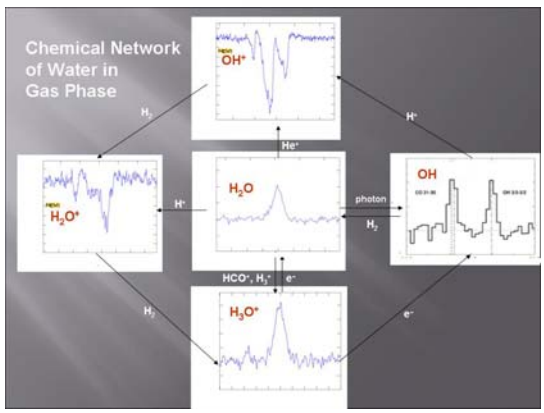


Fig.2: Hydrides showing P-Cyg-like profiles, shifted by -38.4 km/s to systemic velocity of W3 IRS5 and scaled. C II shown for comparison.



3. Model Calculations

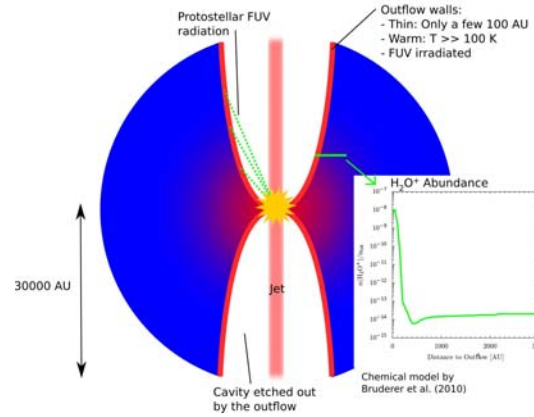


Fig.4: Scenario of outflow walls and disk surfaces irradiated by protostellar FUV. It heats and ionizes a narrow layer (<200 AU). Hydrides enhanced by more than 3 orders of magnitude include OH, OH^+, CH^+, NH^+, SH^+, H_2O^+, and H_3O^+.

4. Observations vs. Model

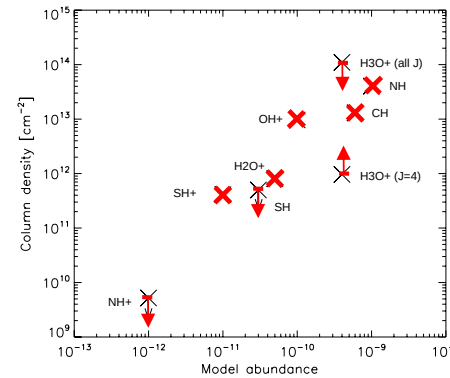


Fig.5: Comparison of observed column density with theoretical beam averaged abundance relative to H_2 (2D model assuming UV irradiation by Bruderer et al. 2010).

Conclusion: **Common trend of observations and model supports scenario of UV heated and irradiated outflow walls.**

Literature: Benz A.O. et al. 2010, A+A, HIFI First Results, sub.
Bruderer, S. et al. 2009, Ap.J. 700, 872
Bruderer S. et al. 2010, Ap.J. in press

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