



Universiteit
Leiden
The Netherlands

A novel way of measuring the gas disk mass of protoplanetary disks using N₂H⁺ and C₁₈O

Trapman, L.; Zhang, K.; Van't Hoff, M.; Hogerheijde, M.R.; Bergin, E.

Citation

Trapman, L., Zhang, K., Van't Hoff, M., Hogerheijde, M. R., & Bergin, E. (2022). A novel way of measuring the gas disk mass of protoplanetary disks using N₂H⁺ and C₁₈O. *American Astronomical Society Meeting Abstracts*, (6), 319.03. Retrieved from <https://hdl.handle.net/1887/3561640>

Version: Publisher's Version
License: [Creative Commons CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/)
Downloaded from: <https://hdl.handle.net/1887/3561640>

Note: To cite this publication please use the final published version (if applicable).

Bulletin of the AAS • Vol. 54, Issue 6

A novel way of measuring the gas disk mass of protoplanetary disks using N_2H^+ and C18O

**Leon Trapman¹ Ke Zhang¹ Merel van 't Hoff² Michiel Hogerheijde³
Edwin Bergin⁴**

¹University of Wisconsin-Madison, ²University of Michigan, ³Leiden Observatory,

⁴University of Michigan, Ann Arbor

Published on: Jun 29, 2022

URL: <https://baas.aas.org/pub/2022n6i319p03>

License: [Creative Commons Attribution 4.0 International License \(CC-BY 4.0\)](https://creativecommons.org/licenses/by/4.0/)

Measuring the gas mass of protoplanetary disks, the reservoir available for giant planet formation, has proven to be difficult. We currently lack a far-infrared observatory capable of observing HD, and the most common gas mass tracer, CO, suffers from a poorly constrained CO-to- H_2 ratio. I will present recently published work where we investigated if N_2H^+ , a chemical tracer of CO poor gas, can be used to observationally measure the CO-to- H_2 ratio in disks and correct their CO-based gas masses. To test this, we set up thermochemical models for the three disks (TW Hya, DM Tau and GM Aur) where HD 1-0 has been previously detected and used to independently measure the disk gas mass. We show that the CO-to- H_2 ratio and gas mass can be measured from N_2H^+ and $C^{18}O$ line fluxes and that these gas masses agree with values obtained from HD within their respective uncertainties. . These results demonstrate the potential of using the combination of N_2H^+ and $C^{18}O$ to measure gas masses of protoplanetary disks.