

Radioactive Molecules for Astrophysical Studies at Texas A&M

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TEXAS A&M UNIVERSITY

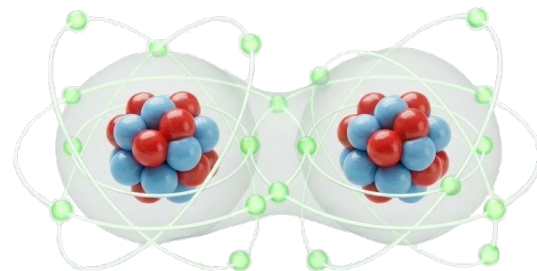
Cyclotron Institute



Karthain Lab
Texas A&M University

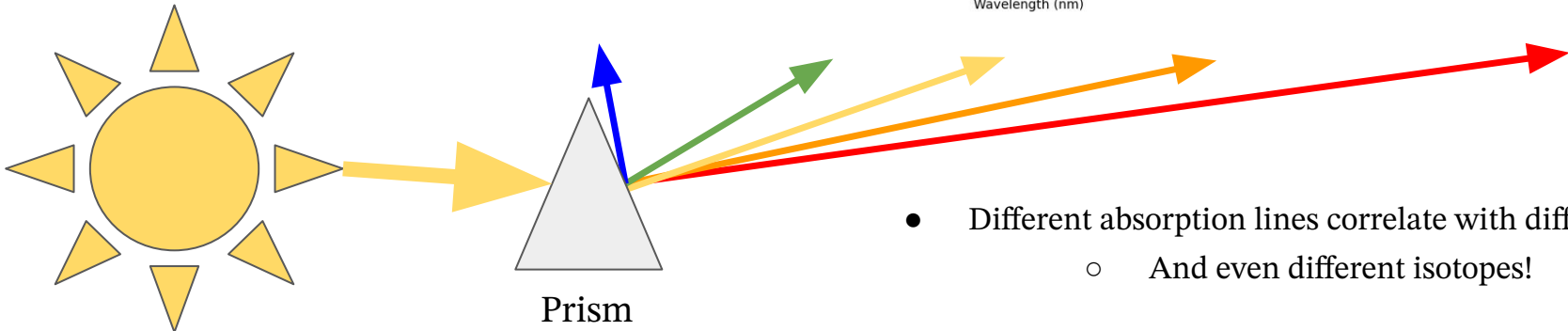
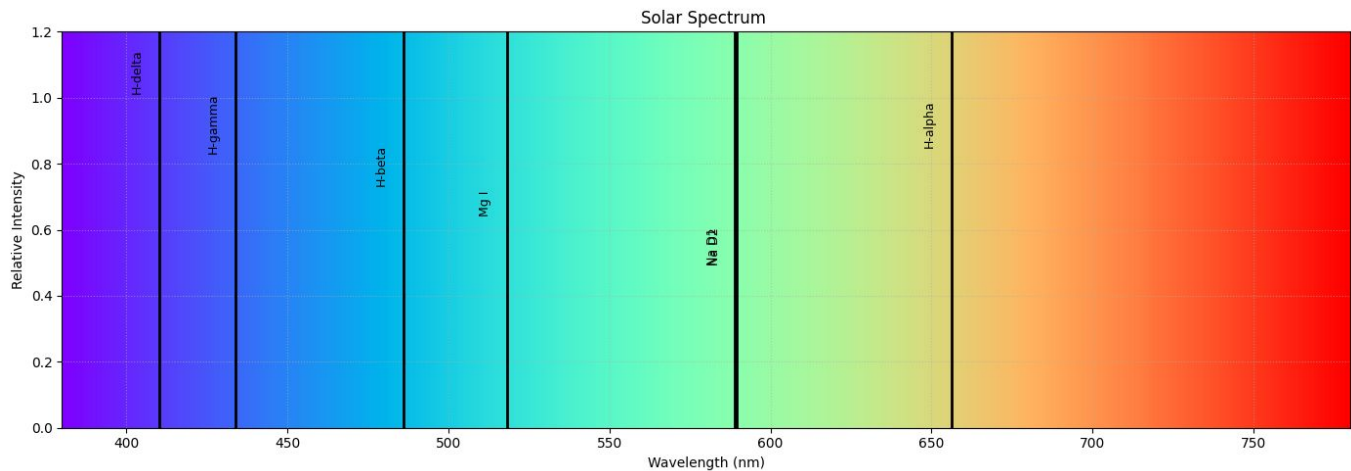
Content:

- Background and Motivation
- Implementation of a CID gas cell
- Future Outlook



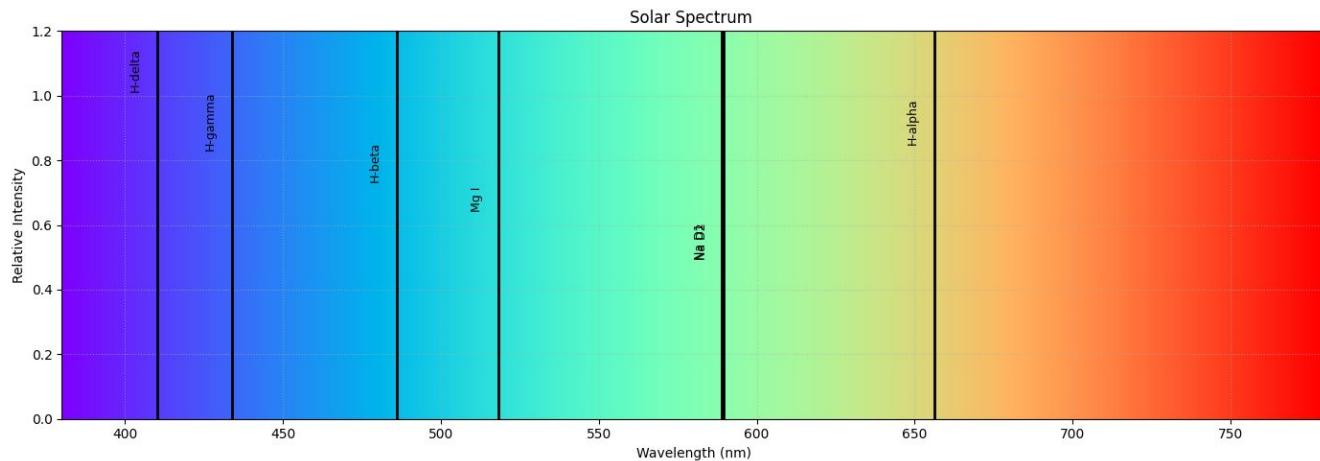
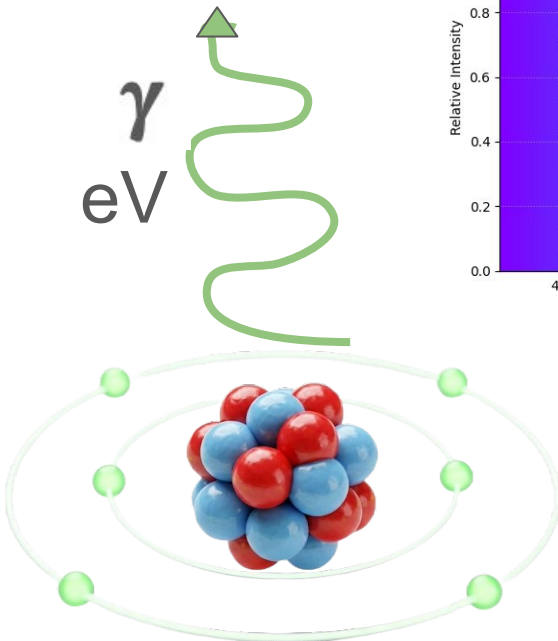
Introduction

- Stable and radioactive isotopes have been studied for decades
- Different stars emit different absorption spectra

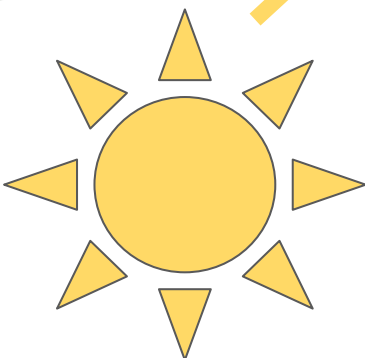
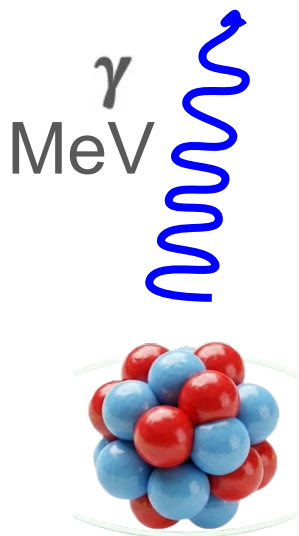


- Different absorption lines correlate with different elements
 - And even different isotopes!

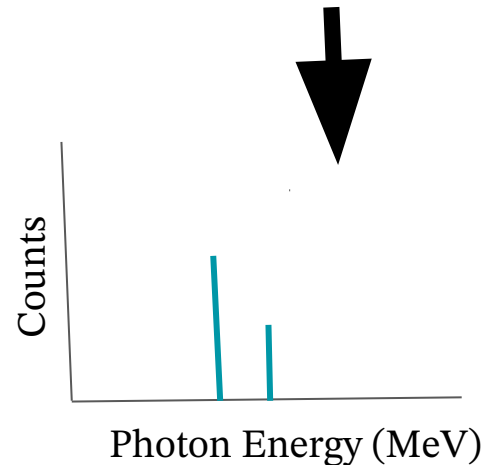
Background

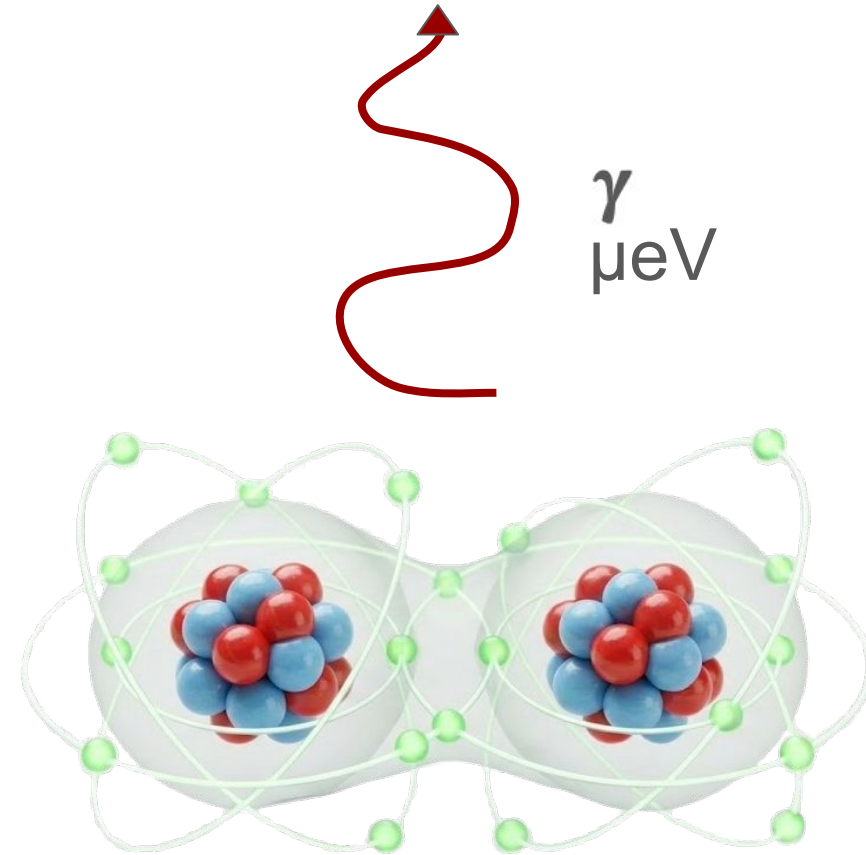
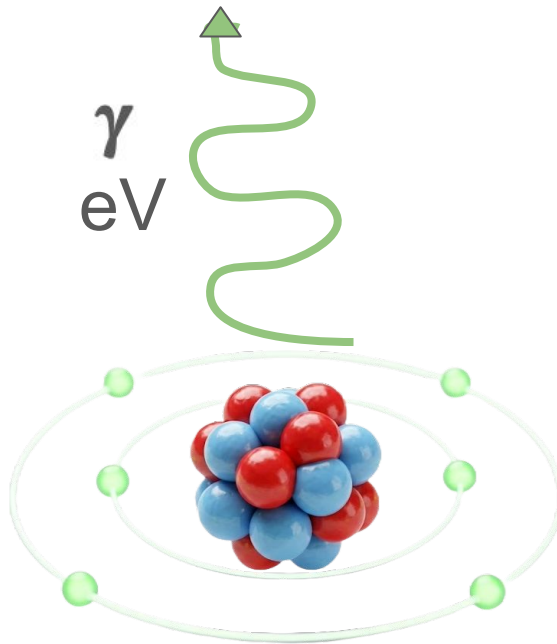
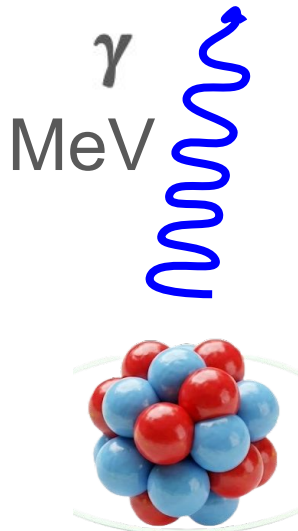


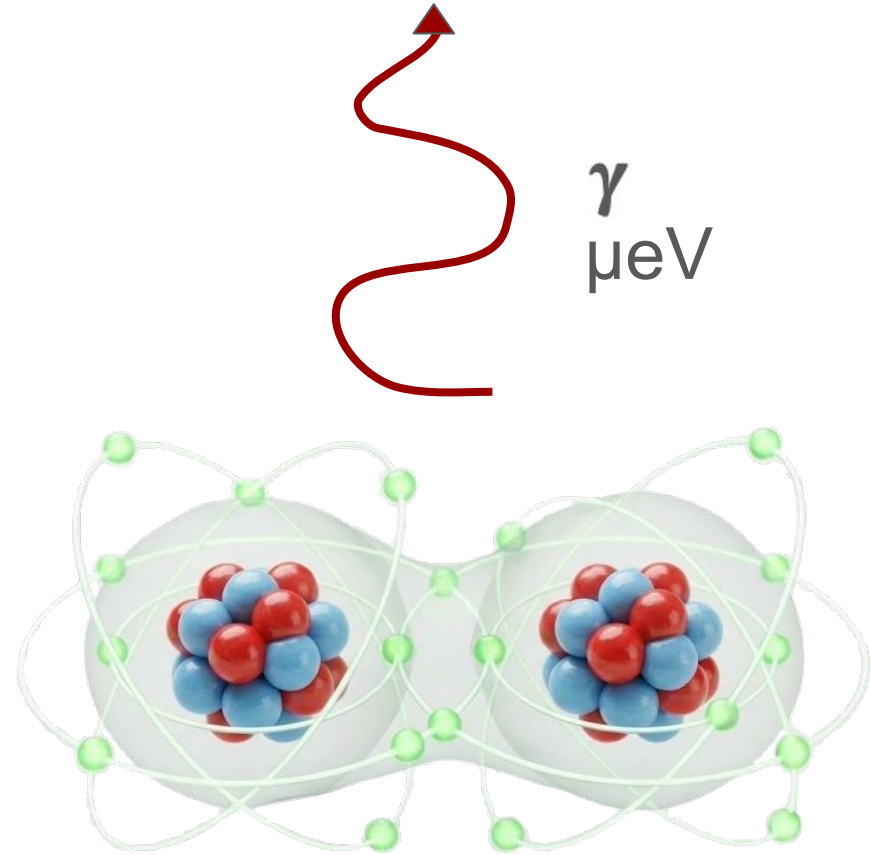
Background



Satellite
Such as INTEGRAL (2.5 angular resolution)







Motivation

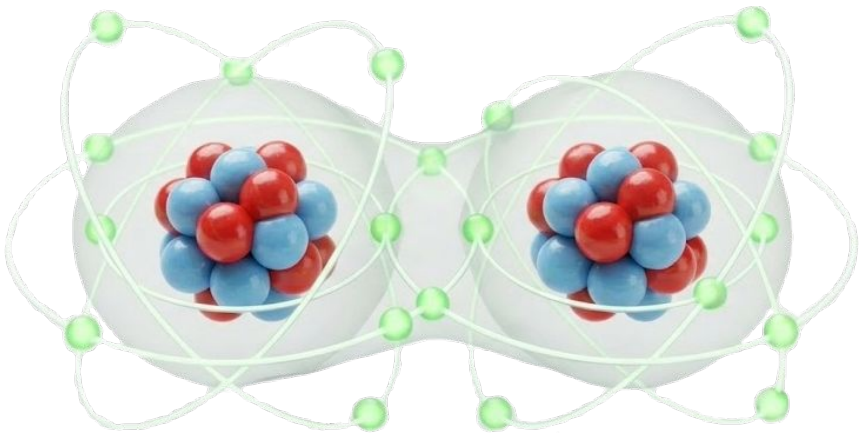


ALMA Radio Telescope - 0.08 degree resolution!

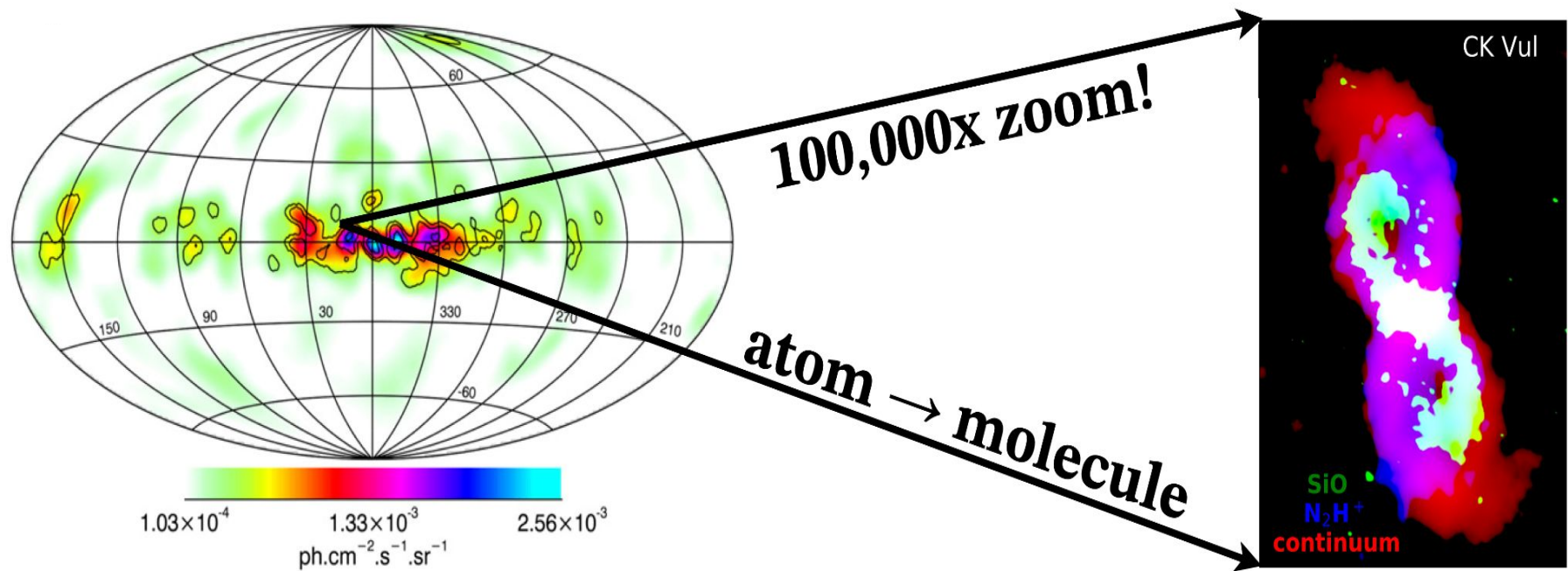
$>10^{10}$ photons!!



γ
 μeV



Motivation

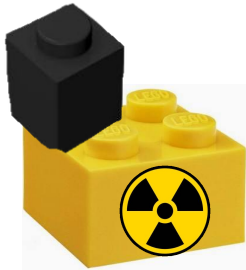


1. Production

2. Spectroscopy

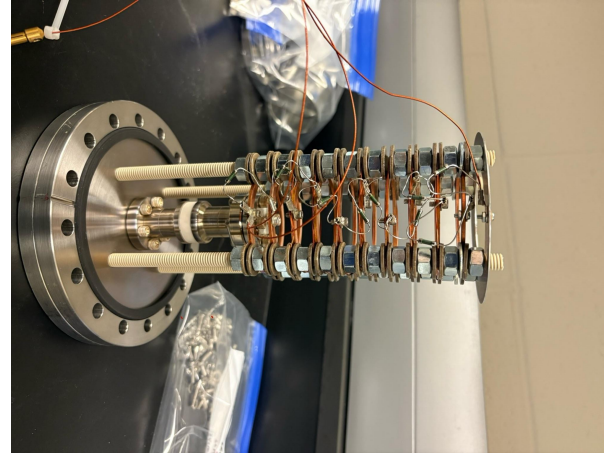
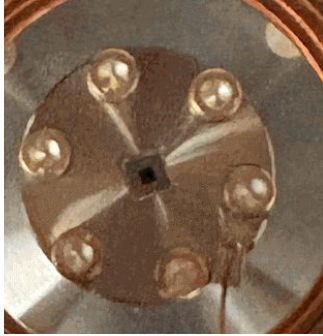


Beam
From Cyclotron

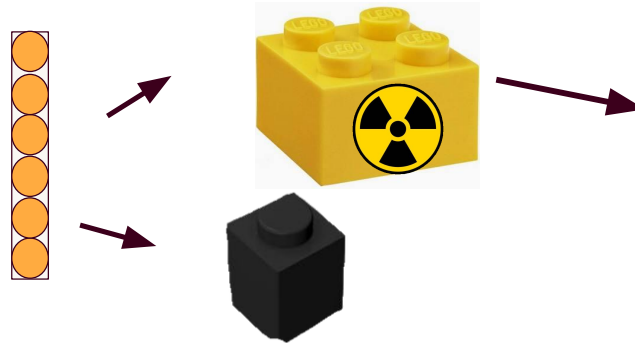


CID GC How Does it Work?

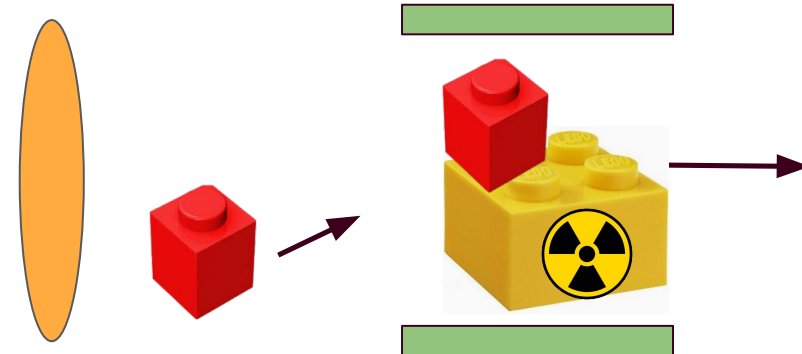
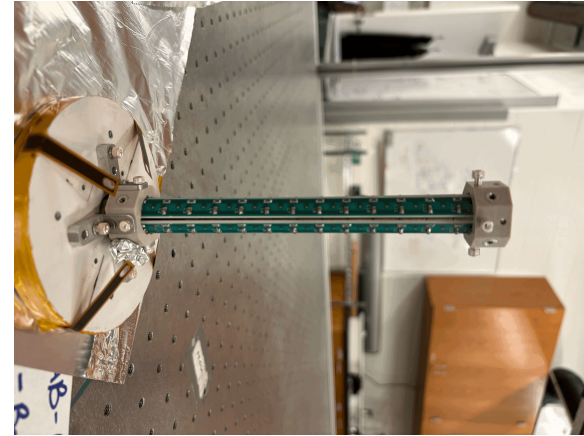
Si_3N_4
Membrane
(21nm thick)



Drift Cage

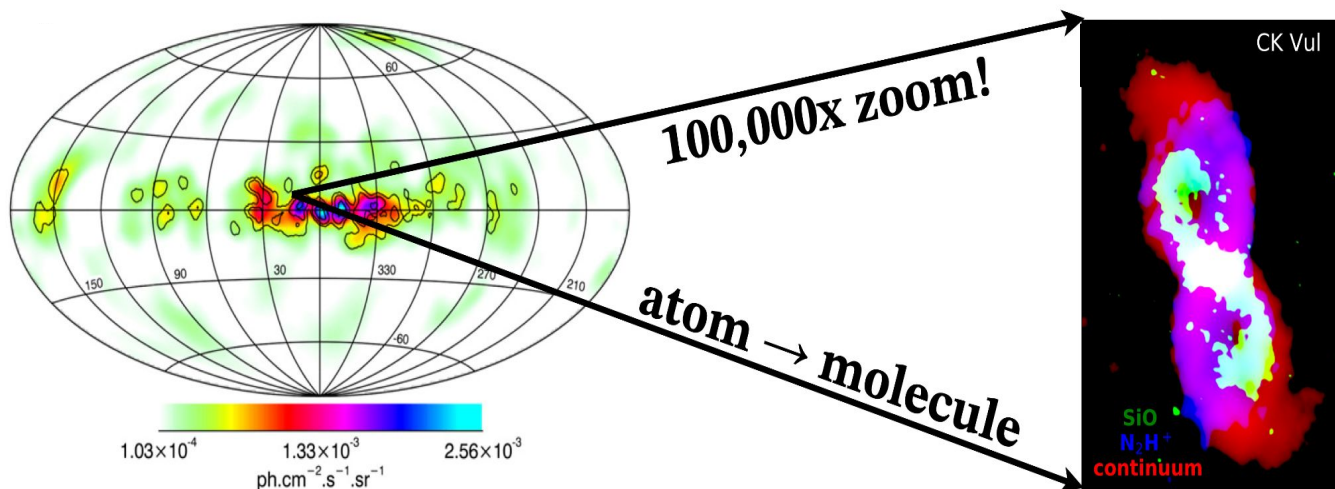
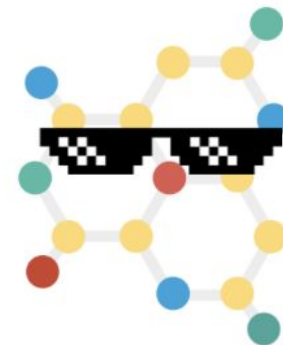


Radio Frequency Quadrupole (RFQ)



Outlook

- Radioactive molecules are exciting
- First tests with ^{28}SiO
 - Good test case because known to be in stellar environments
 - Already information on this molecule!
- Start with stable ^{28}SiO then go to ^{27}SiO



Acknowledgements

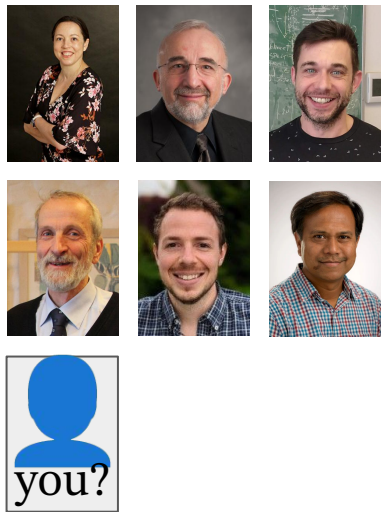
Group @A&M



Experimental Collaborators



Theory Collaborators



Funding

