

The Next Generation of Community-Requestable Instrumentation in ACOM



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Wing-Pod CIMS

Project:

- Bring cutting-edge chemical ionization technique and expertise to ACOM
- Mount a custom chemical ionization mass spectrometer (CIMS) in a GV wing pod
- Focus on iodide-adduct reagent, but can use others (e.g. benzene cation, ammonium, etc)

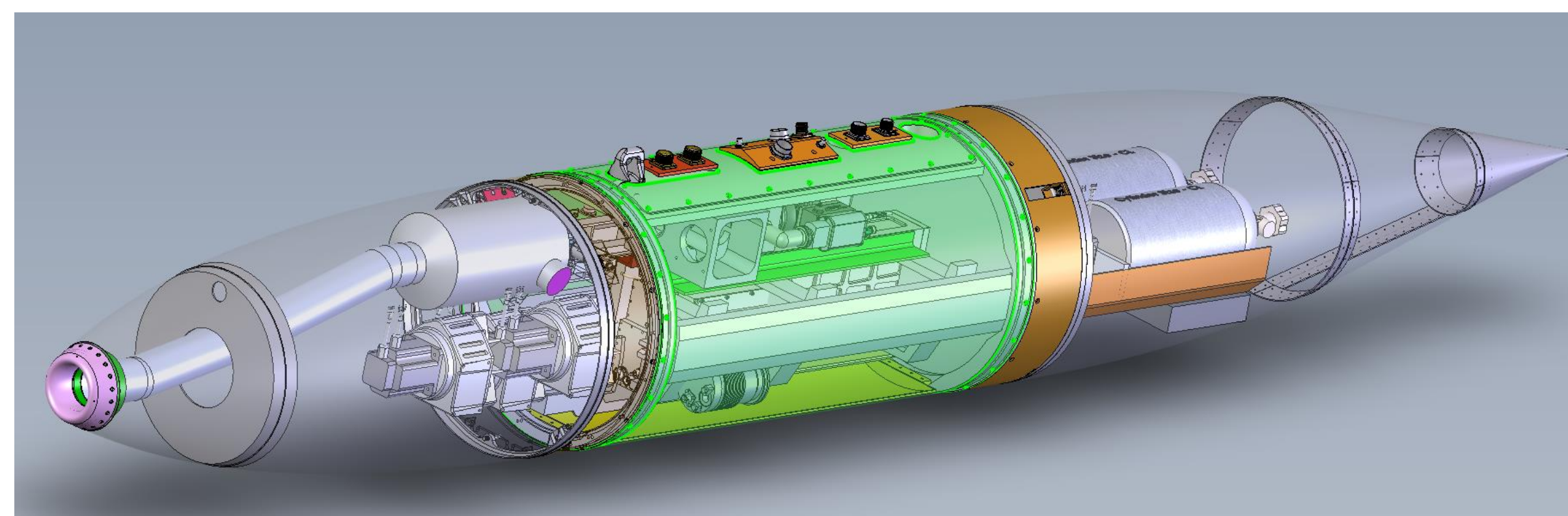
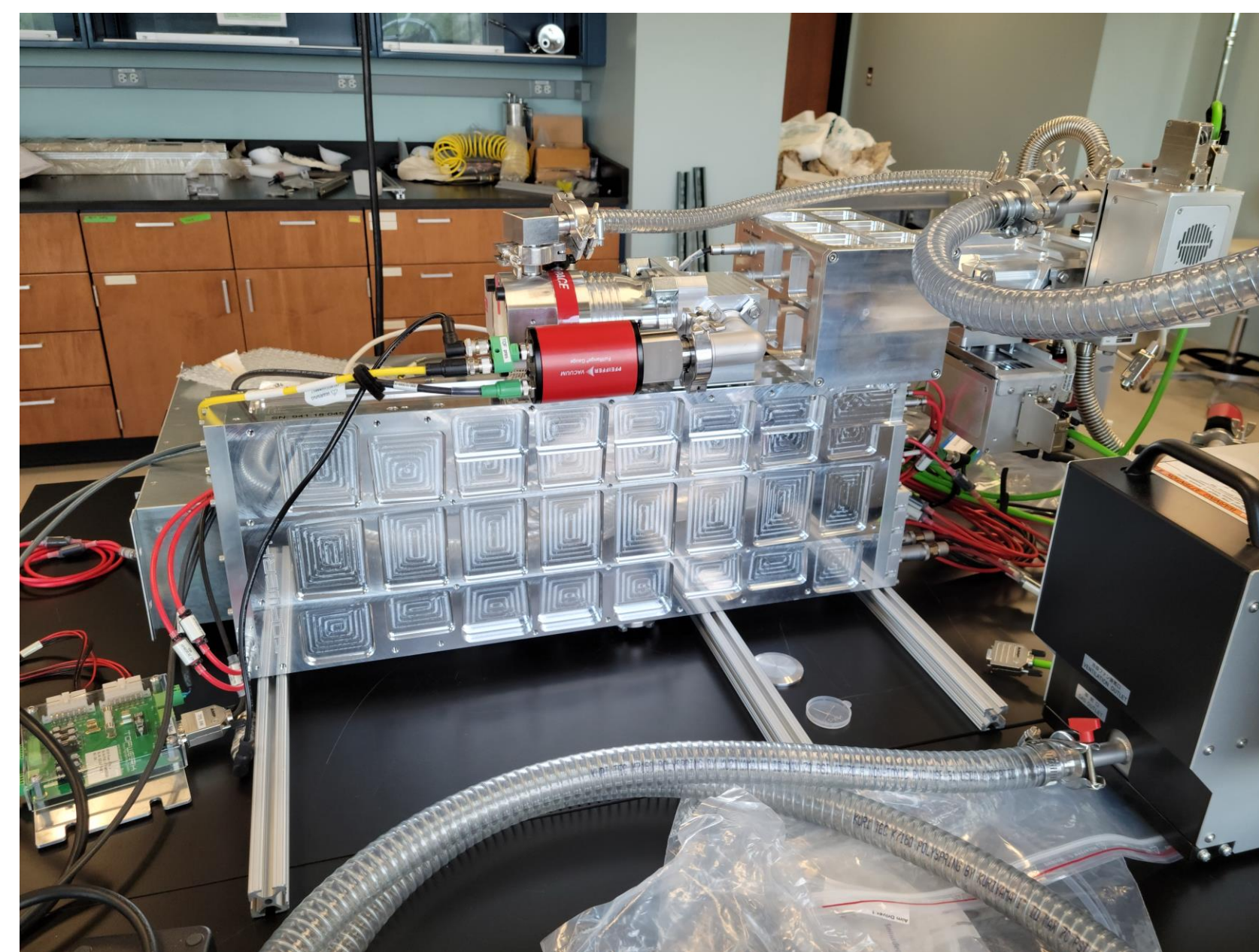


Benefits:

- CIMS is a powerful and versatile technique, can measure:
 - Oxidized organic gases
 - Some inorganics (HONO, HCN, etc.)
 - Some halogens (Cl₂, ClO, HBr, etc.)
 - Nitrogen species (N₂O₅, org nitrates, etc.)
- Free up cabin space for community instruments

Progress:

- CIMS has been designed, ordered, and delivered in May 2023
- Wing pod installation engineering is underway
- Making plans for test flights; will be community-requestable for flight campaigns by mid 2026



Laser Induced Fluorescence Measurements of NO

Project:

- Upgrade ACOM's mission-critical nitric oxide (NO) measurements to LIF from current chemiluminescence
- NO measurement is the basis for possible NO_x, NO_y, N_r measurements

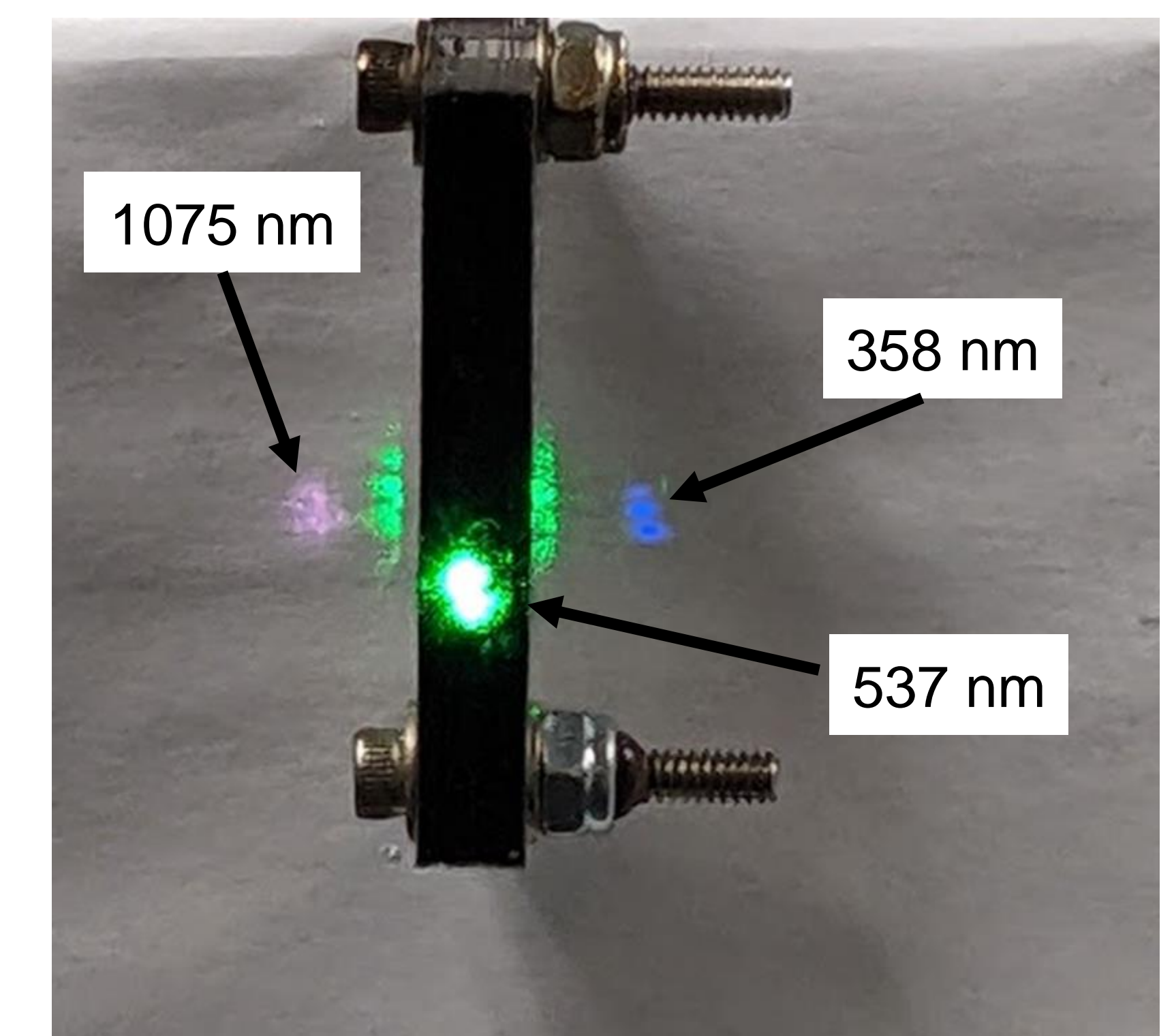
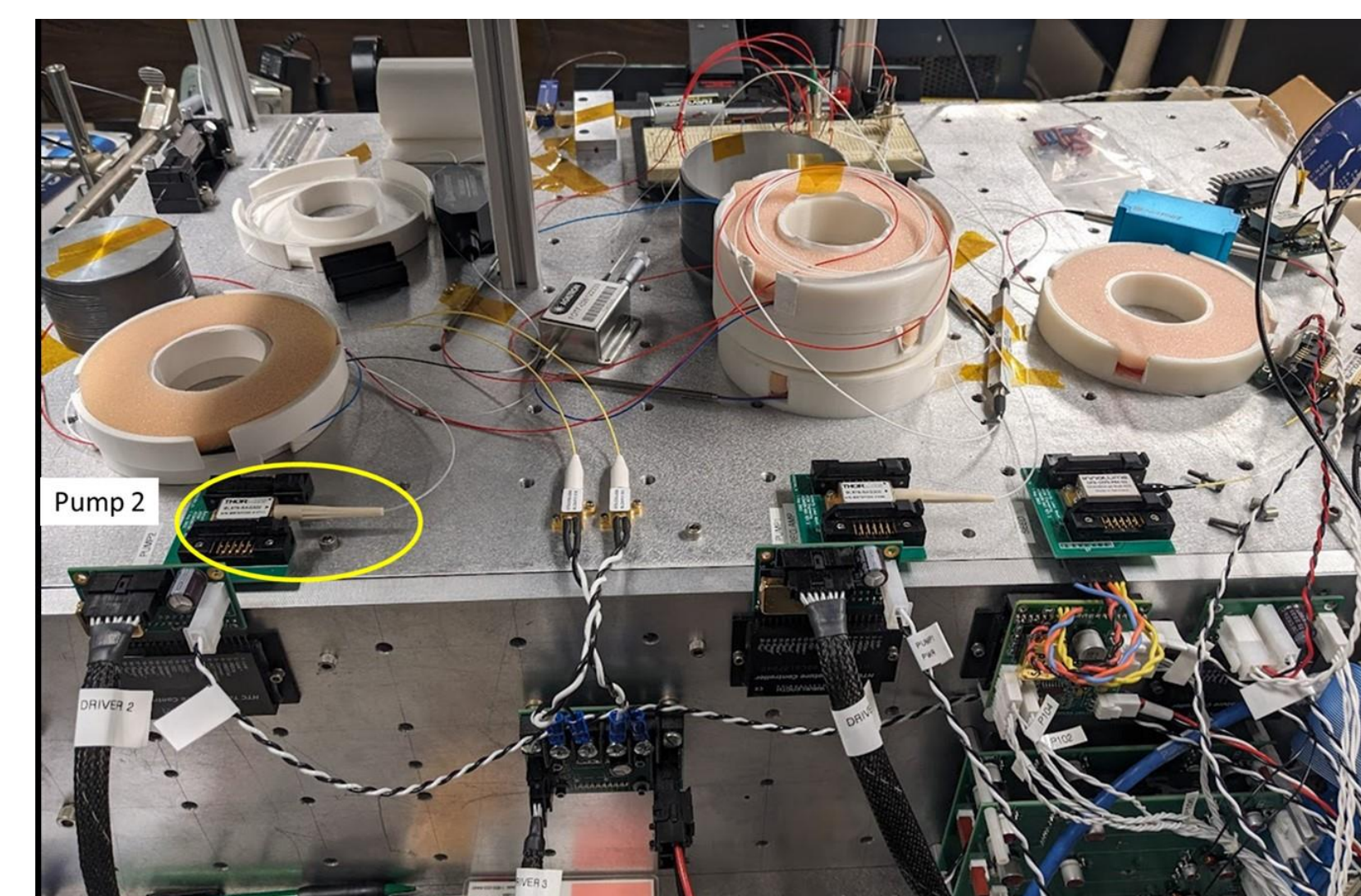
Benefits of LIF vs Chemiluminescence:

- **Lower detection limit:** ~1 pptv vs ~10 pptv @1 sample/sec
- **More compact:** half the size+weight
- **Fewer consumables:** No need for pure O₂ bottles or dry ice
- **Easier to operate:** less people effort, lower deployment costs
- **Parts availability:** PMT (and other parts) for Chemiluminescence instruments are out of production (it's a >20yo instrument!)



Progress:

- Currently in the process of building a benchtop prototype
- Future work: community-requestable deployment in cabin; eventually aim to fly in a wing pod



ACKNOWLEDGMENTS

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- RAF engineering team
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