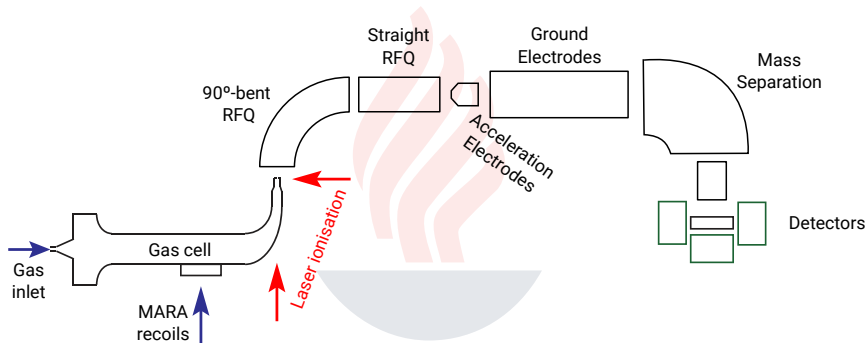


A stylized torch logo is centered in the background. It features a light gray torch handle and a bowl, with a red flame rising from the bowl. A thin horizontal line is positioned just below the torch bowl.

THE MARA-LEB VACUUM SYSTEM

Jorge Romero



Gas Cell

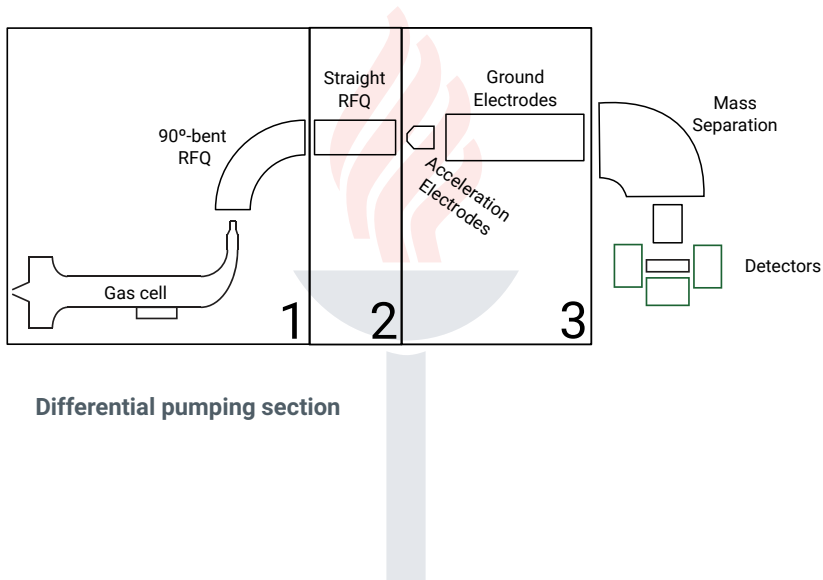
Recoils from MARA are stopped and neutralised in the gas cell using a buffer gas (He or Ar).

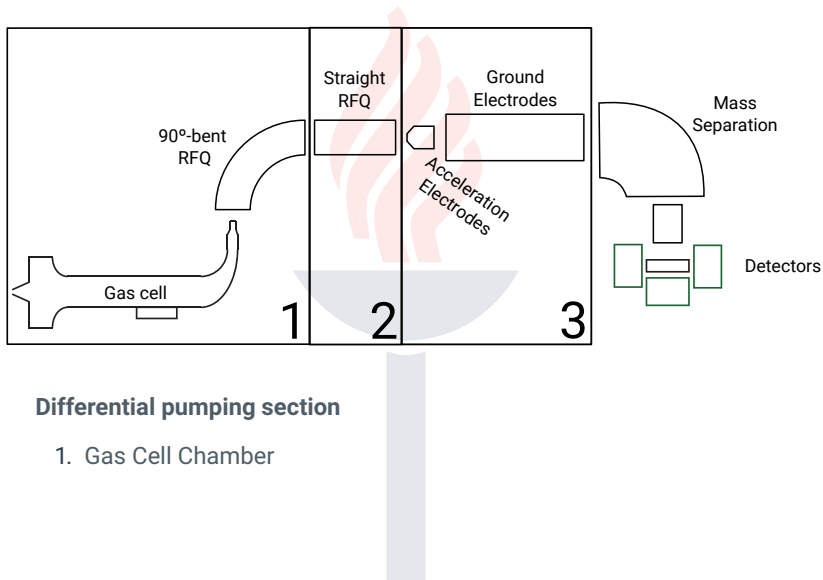
They are evacuated using the gas flow and laser ionised inside the gas cell or in the gas jet.

Transport

Ions are transported to detector stations using ion optics.

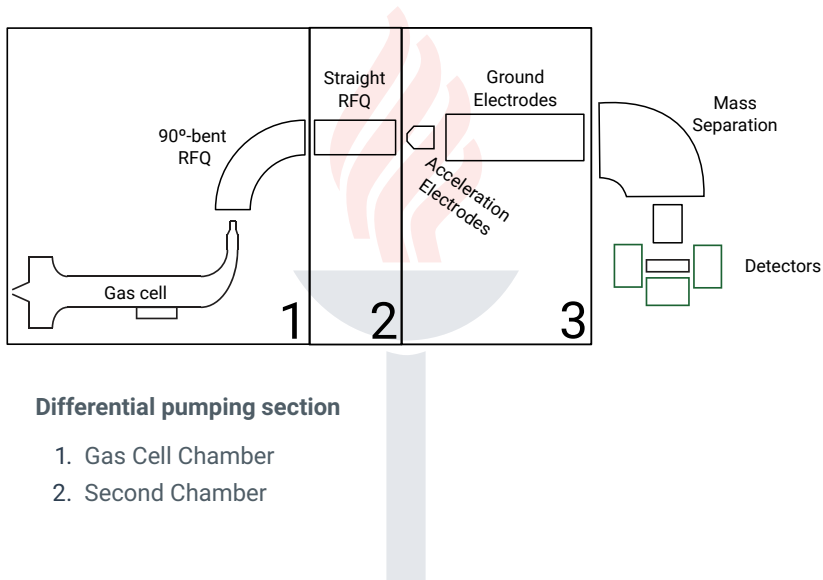
They are mass selected before the detector station via a dipole magnet.

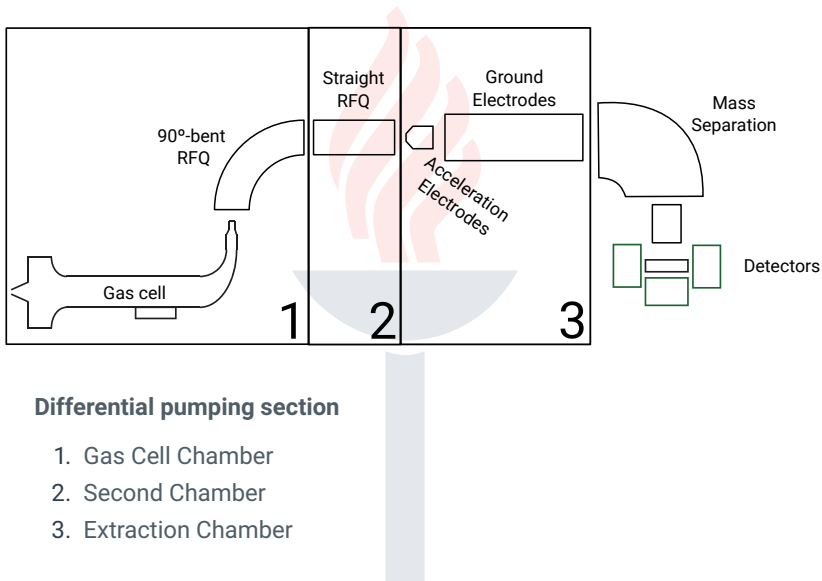


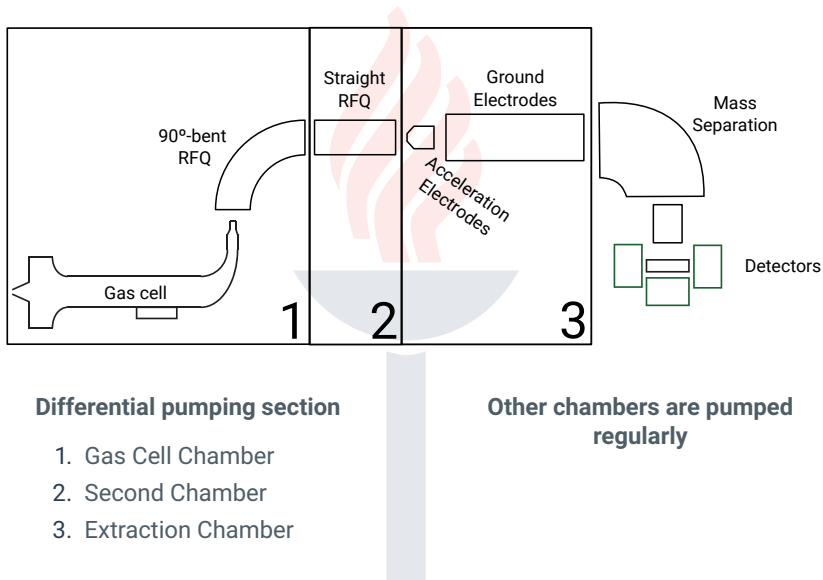


Differential pumping section

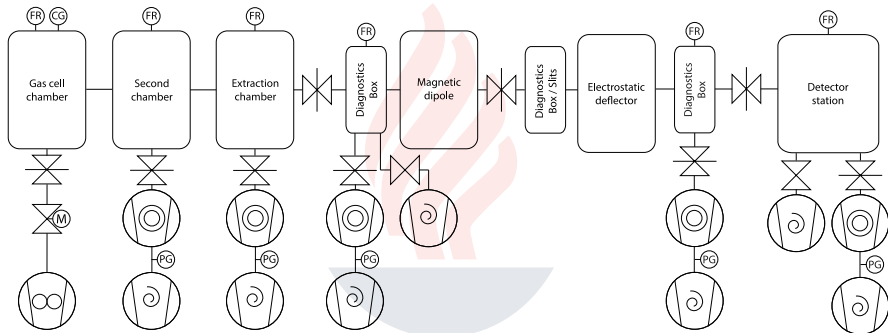
1. Gas Cell Chamber





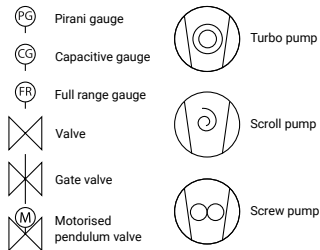


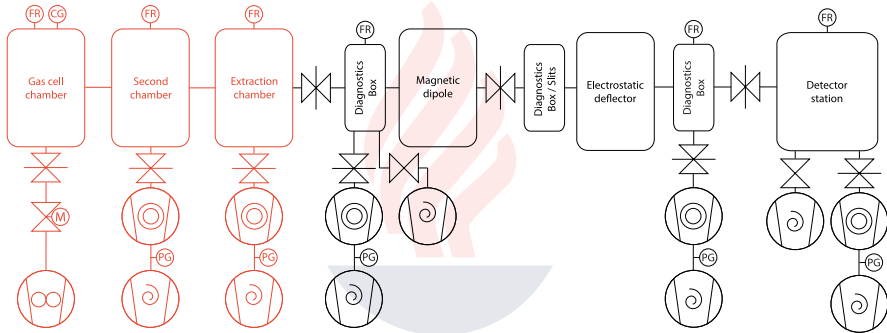
VACUUM SYSTEM



Connection to MARA

MARA is kept at high vacuum, so the gas cell needs a thin window that can withstand pressure differences of up to $\sim 1\text{E}10$ mbar, but not stop recoils before entering the cell.



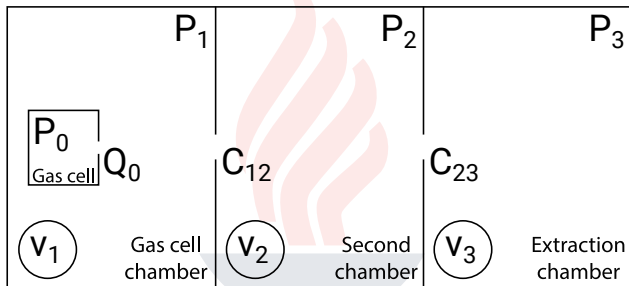


Differential pumping section

The gas cell chamber is going to have a constant inflow of gas, thus needing more powerful pump and valves that allow for the regulation of the gas flow into the screw pump.

Normal pumping section

Thanks to the gate valves, entire sections of the beamline can be pumped separately and isolated to open other sections.

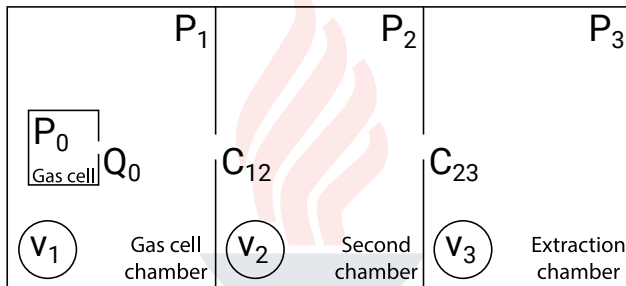


Apertures and Pipes

- A_0 : $d = 0.5 - 1.2 \text{ mm}$
- A_{12} : $d = 5 \text{ mm}$, $\ell = 10 \text{ cm}$
- A_{23} : $d = 5 \text{ mm}$, $\ell = 10 \text{ cm}$

Physical Properties

- Volumes = 100 L
- Surface area = 1.2 m^2
- Outgassing = $1.8\text{E-}7 \text{ mbar L/s/cm}^2$

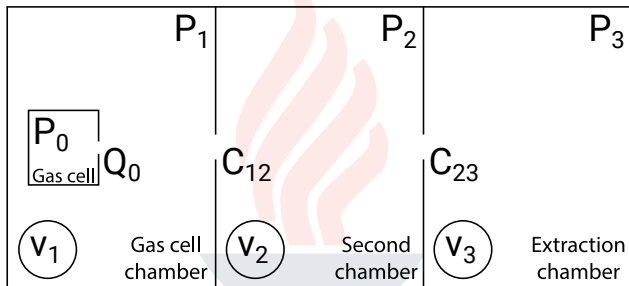


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Physical Properties

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Pumping Speeds

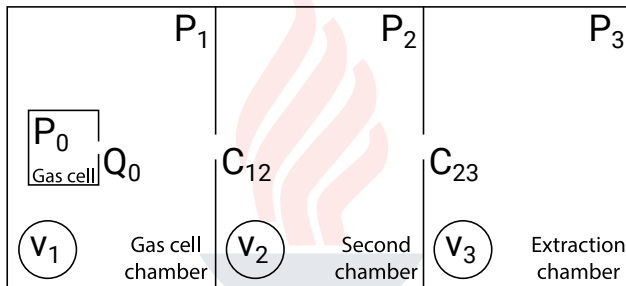
- $v_1 = 1056 \text{ L/s}$ (Screw)
- $v_2 = 2000 \text{ L/s}$ (Turbo)
- $v_3 = 1000 \text{ L/s}$ (Turbo)

Gas Cell Load

- $Q_0(\text{He}) = 55\text{-}650 \text{ mbar L/s}$
- $Q_0(\text{Ar}) = 20\text{-}200 \text{ mbar L/s}$

Leak Loads

- $Q_{\text{leak}} = 1\text{E-}7 \text{ mbar L/s}$



Pumping Speeds

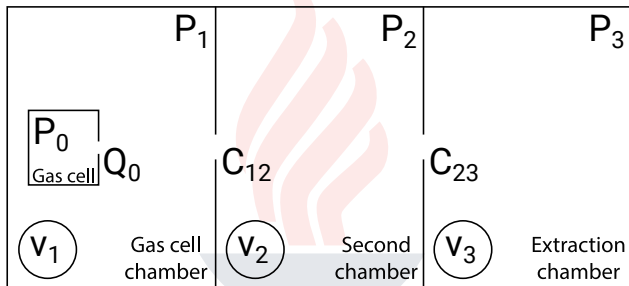
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- $Q_0(\text{Ar}) = 20\text{-}200 \text{ mbar L/s}$

Leak Loads

- $Q_{\text{leak}} = 1\text{E-}7 \text{ mbar L/s}$



Target Pressures

- $P_0 = 500\text{-}1000\text{ mbar}$ (He or Ar)
- $P_1 \simeq 0.01 - 0.1\text{ mbar}$
- $P_2 \simeq 10\text{E-}6 - 0.01\text{ mbar}$
- $P_3 \simeq 10\text{E-}6\text{ mbar}$

