l'Observatoire de Paris | SYRTE

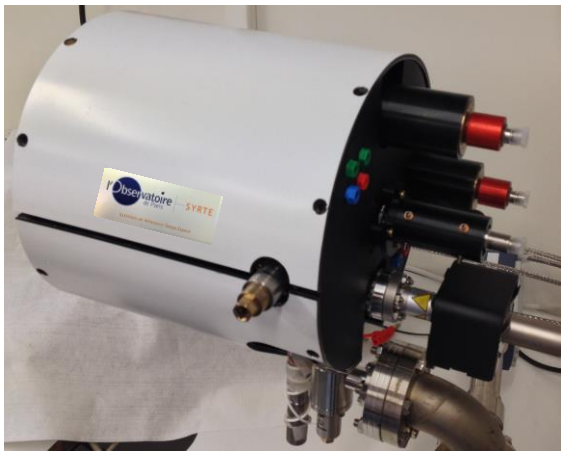
Systèmes de Référence Temps-Espace

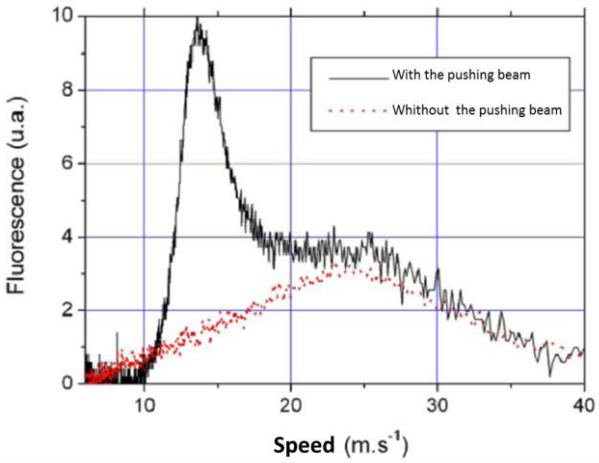
Institut Francilien de Recherche sur les Atomes Froids IFRAF

2 Dimensional Magneto-Optical Trap 2DMOT

Presentation:

Issued from the technological developments at SYRTE within the framework of its scientific projects, this 2 Dimensional Magneto-Optical Trap produces a continuous slow and collimated atomic beam of Cesium or Rubidium. This system is usually used in experiments with cold atoms and about atomic interferometry. In particular the 2DMOT of SYRTE can be used to reduce by a factor 10 the loading time of a 3D magneto-optical trap, while preserving an extremely low residual pressure.





Technical specifications:

- Maximum atomic flux: **~ 10^{10} atoms.s^{-1}**
- Atomic beam divergence: **~ 30 mrad**
- 3DMOT loading time: **~ 10^8 atoms in 50 ms**
- Mean longitudinal atomic velocity: **13 m.s^{-1}**
- Transverse temperature: **~ 400 µK**
- Laser cooling beam power needed: **~ 150 mW**
- Rb pressure in the 2DMOT region: **~ 10^{-7} mbar**
- Maximum recommended distance between 2DMOT and 3DMOT: **~ 300 mm**

Plot extracted from the thesis of P. Cheinet – « Conception et Réalisation d'un gravimètre à atomes froids » - University Paris VI - 2006

Advantages:

- Connection to an existing experimental setup by a non-rotating CF16 flange
- Pumping by ionic pump 2L/s
- Turbomolecular pumping through CF16 valve
- Alkaline reservoir (Cs or Rb) from 0,2 to 10 grams
- Pressure of alkaline controllable by regulating the reservoir temperature
- Alkaline reloading without braking vacuum in the main chamber
- Injection of the optical beams through optical fiber (FC-APC / PM) collimator are supplied
- Continuous monitoring of atomic absorption in the atomic jet

Specific applications:

- Cold atoms experiments using 3DMOT or optic molasses
- Experiments about atomic interferometry
- Sources of slow and cooled atoms

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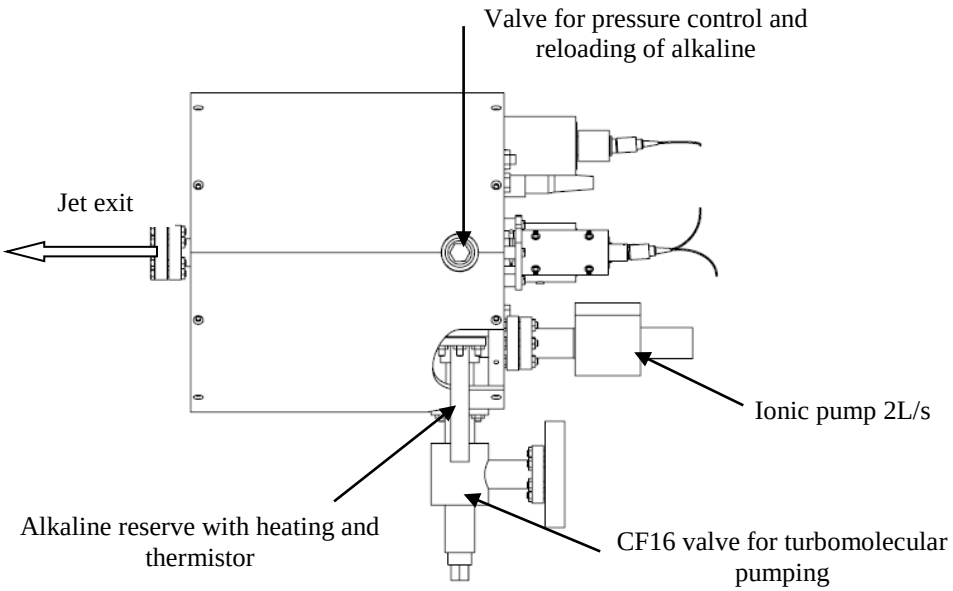
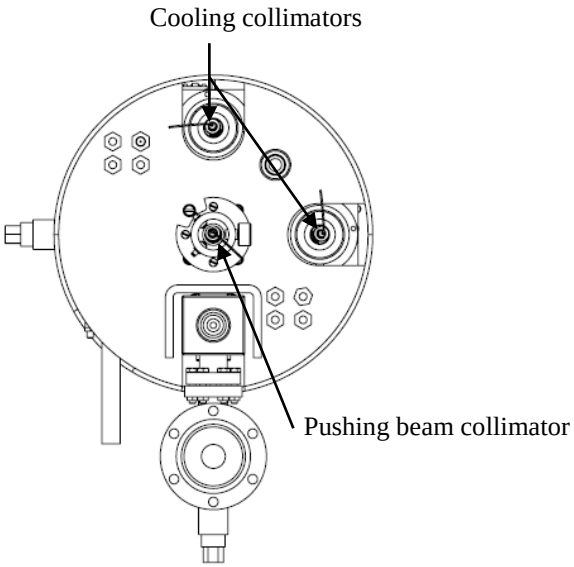
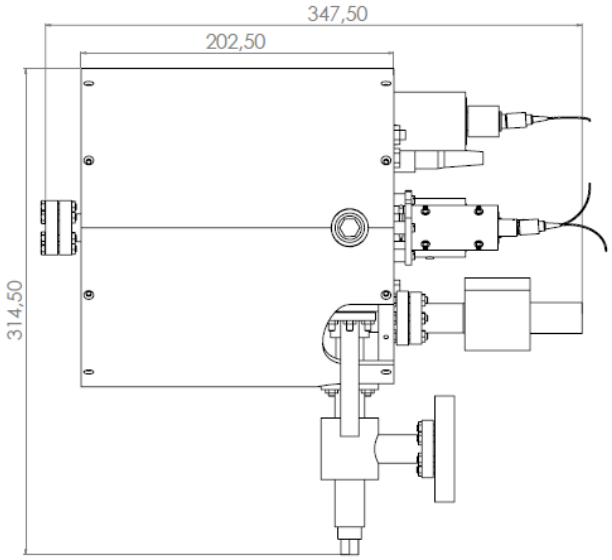
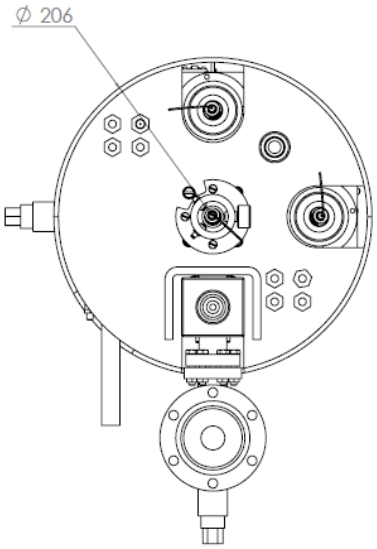
General features:





Dimensions (mm):





Warning: when devising your system do not forget to take into account optical fibers and ion pump cable.

Not supplied:

3 polarization maintaining optical fibers with FC-APC connector
Ion pump, Varian MicroVac (ref. 9290201) recommended
Power supply for magnetic field coils (3A - 12V)
Power supply for heating of the alkali reservoir
Power supply for the monitoring circuits (±15V)

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