Beam rejection and related aspects

- There is PARIS (physics, geometry, electronics) … but not only …
- Other aspects of the experiment might be critical

  -> Heavy-ion (ER) detection requires powerfull beam rejection for fusion @ 0°

  -> (Radioactive) beam properties (size, timing)

1. Beam rejection for ER detection

× **Some physics cases based on fusion require :**

- tagging of the reaction mechanism (ER selection)

- velocity and direction of the γ emitter

- nuclear mass A and charge Z

× **Direct ER measurement -> HI analyzer @ 0°**

-> mandatory beam rejection !

Coupling of PARIS with VAMOS

× **Asymmetric direct kinematics :**

-> gas-filled mode most efficient well suited for ER tagging and (v,angle) determination

e.g. transmission ≈75% for Ca(4AMeV)+Sm, uniaue worldwide

-> vacuum mode when (A,Z) necessary for A ≈ 150 and few AMeV

at the price of lower transmission

× **Symmetric kinematics :**

-> gas-filled mode for ER tagging and (v,angle) determination

-> vacuum mode when (A,Z) necessary for light systems

heavy systems with E>6AMeV

× **Inverse kinematics :**

-> gas-filled mode for E>7AMeV

× **Reliability of Q parameterisations used in feasibility**

× **VAMOS not suited for all desired kinematical schemes**

Alternatives (1)

× **VAMOS @ ϑ > 0°**

× **Krakow Recoil Filter Detector (RFD) :**

-> (1.8° - 12°) angular coverage
-> Mechanism tagging via pulse height vs TOF
-> So far :

Si (141 MeV) + Lu , O (125 MeV) + Fe, O (68 MeV) + Si,
Ar(175 MeV) + Gd , Si (160 MeV) + Yb, Si+Si

$V_{beam} / V_{ER} = (2 - 7)$

-> Symmetric systems for heavy masses ?
-> Inverse kinematic ?

× **SPEG ?**

Alternatives (2)

- **Gammas (discrete lines, Fold)**
  -> difficult in radioactive environment

- **Charged particle detection**
  -> access to (v,angle)
  -> HECTOR-GARFIELD like setup
  -> suited for LCP channels

- **Neutron detection**
  -> suited for pure neutron channels
  -> influence of the radioactive environment ??

2. Beam quality aspects

- Well defined in energy
- Timing : below 1ns resolution ?
  - -> beam detectors ?
  - -> time from γ's
- Beam halo, spot size, losses and scattering
  - -> radioactive decay of the implanted ions around the target
  - -> estimate for EXOGAM2 by E.Clement and G.de France :
    for I = 5.10^9 pps, 30 kHz in each EXOGAM core