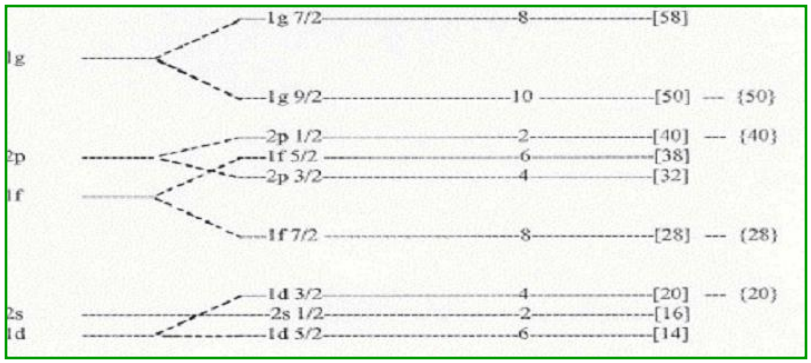
Simulations on HiRA experiment for Transfer Reactions (p,d) with beams at 35MeV/A in *inverse kinematics* (Cross section measurement)

Test Run

- $p(^{40}Ar,d)^{39}Ar$ [g.s. – 1 $f_{7/2,}$ e.x. – 2 $dp_{3/2,}$] Ex=1.267MeV
- $p(^{38}Ar,d)^{37}Ar$ [g.s.– 1 $d_{3/2}$ e.x.– 2 $s_{1/2}$] Ex=1.409MeV



In the simulation, we assumed

Target: CH_2, 20μm

✓Beam spot size: 2cm

✓σ of primary beam energy: 1MeV/A

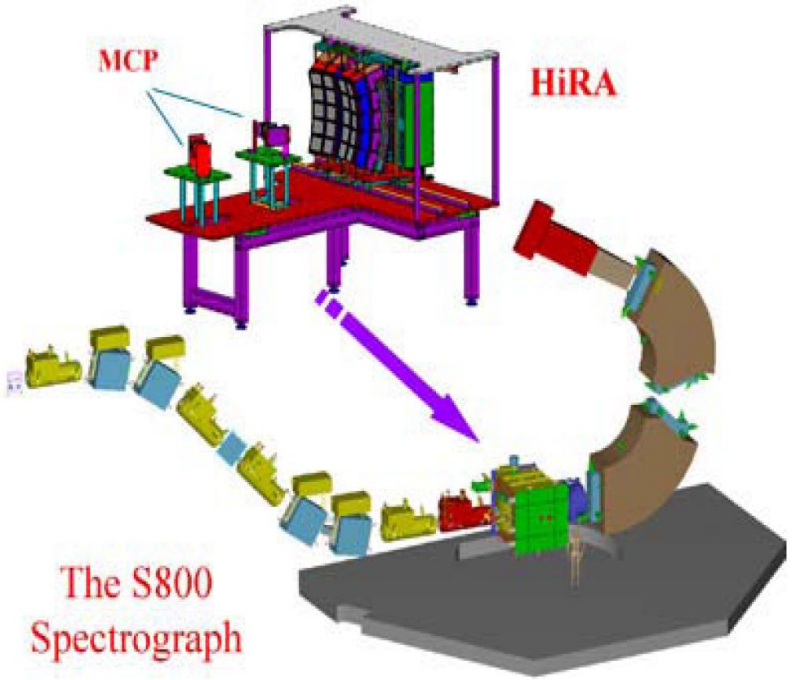
✓Momentum acceptance : 1%

✓DE resolution: 70keV (FWHM)

✓EF/EB resolution: 100keV (FWHM)

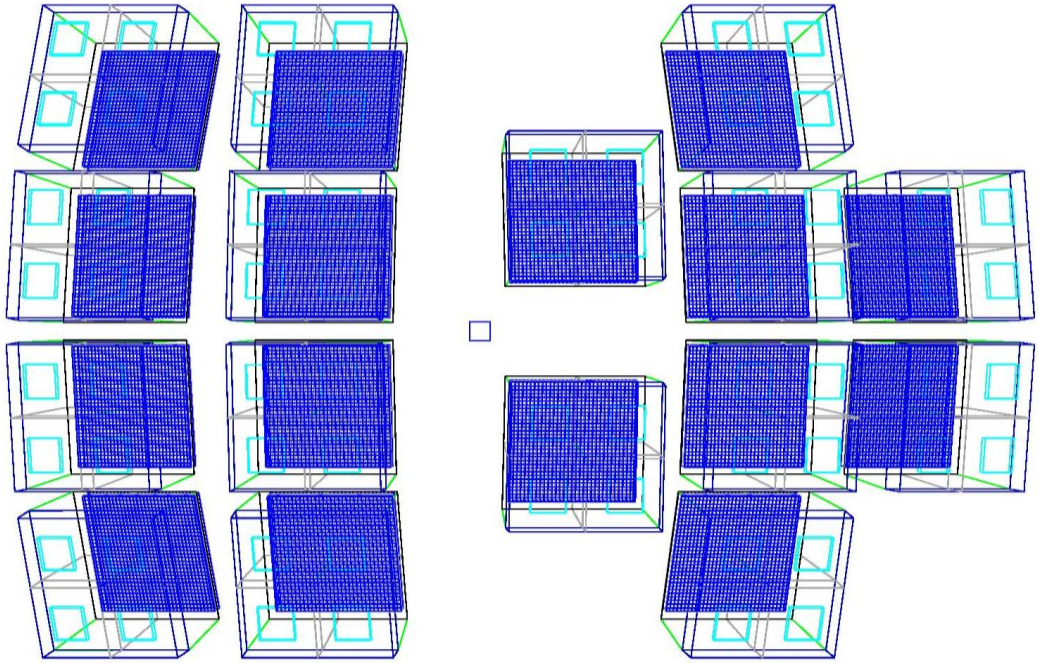
✓CsI resolution: 500keV (FWHM)

✓Position resolution on target: 1.5mm (FWHM)



Simulations

- DE +E+CsI in each telescope
- 16 telescopes and 5 towers
- target – HiRA distance: 35 cm



Angles for the Towers

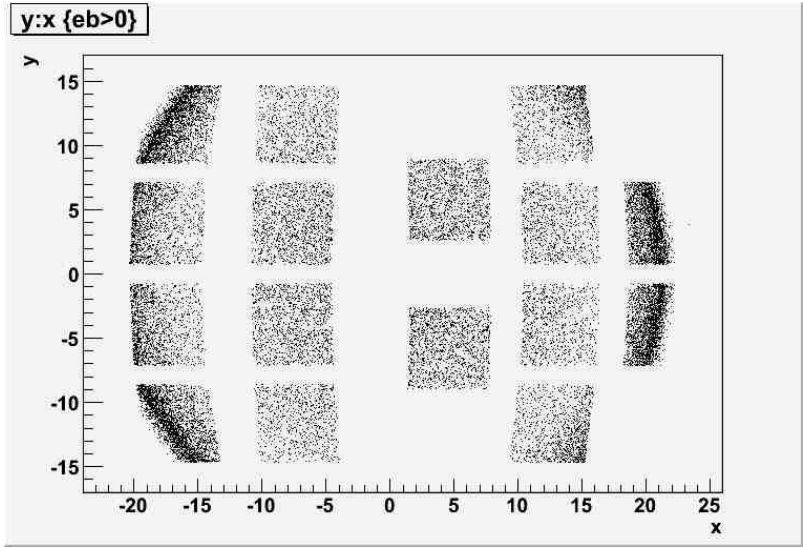
-29.5

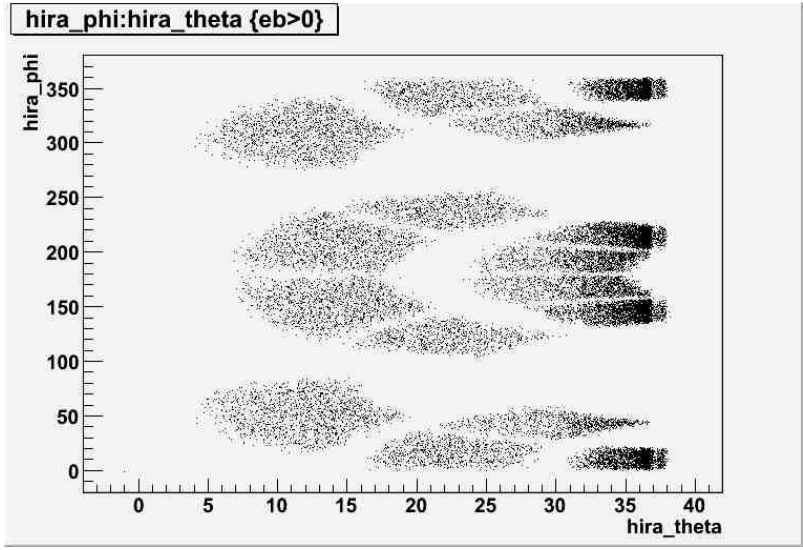
-12.5

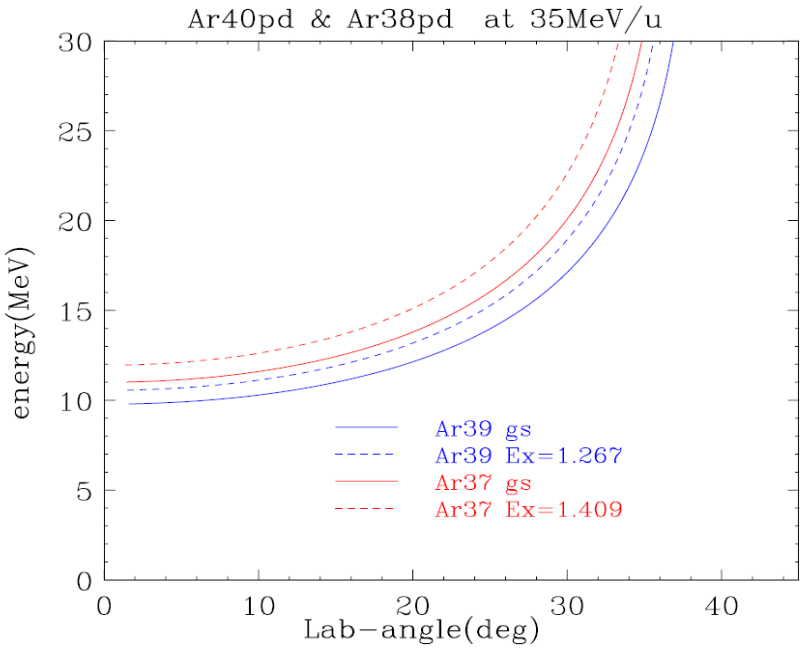
7.6

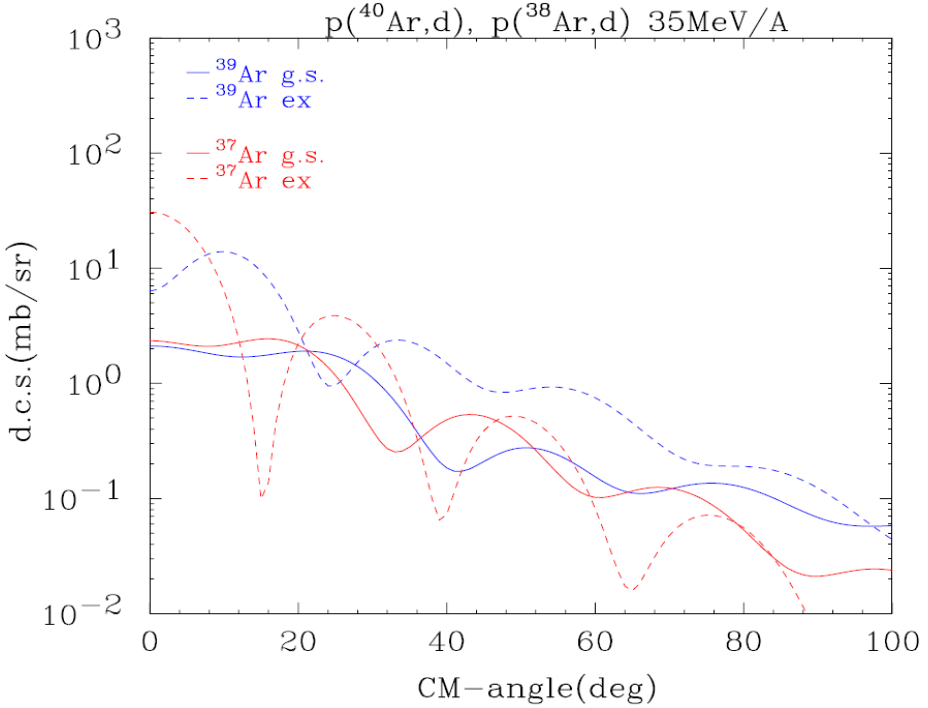
22.1

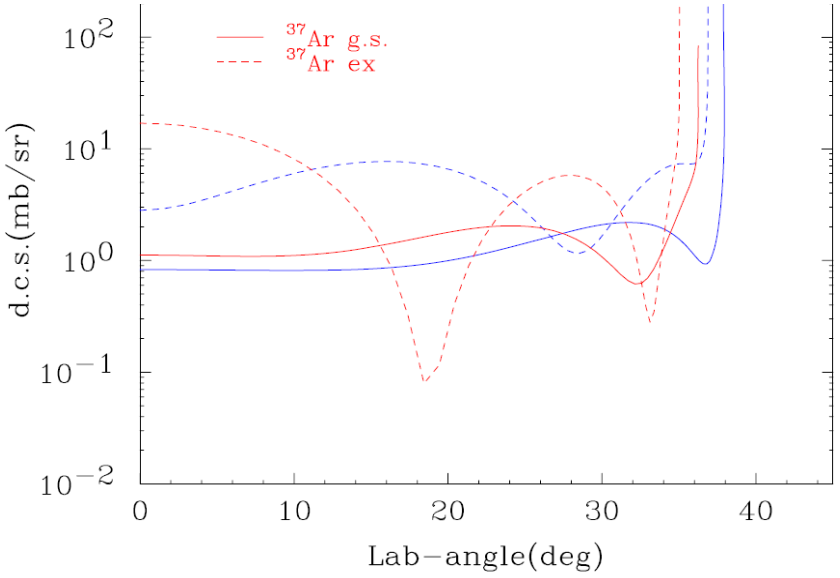
36.6

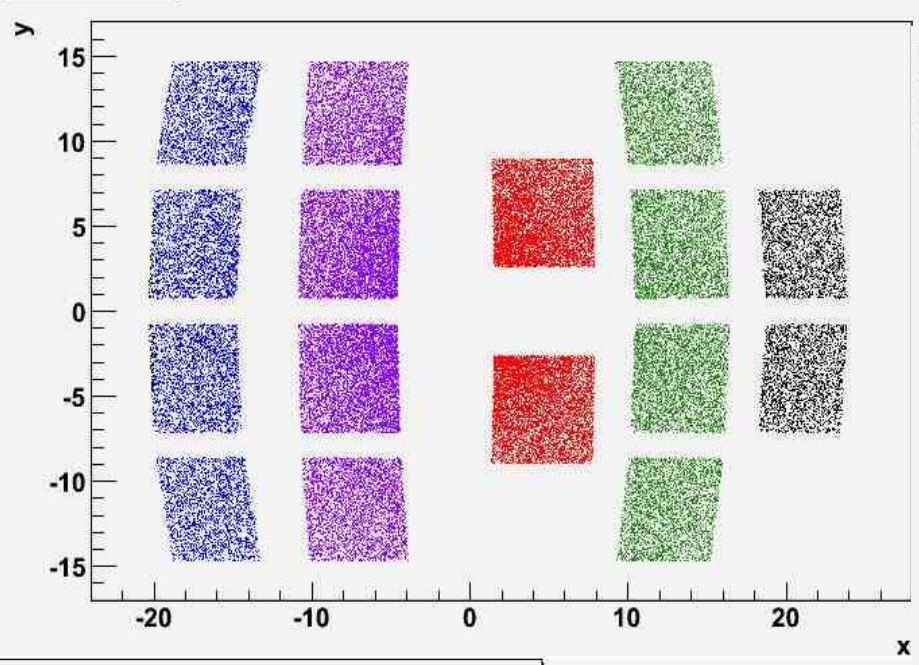


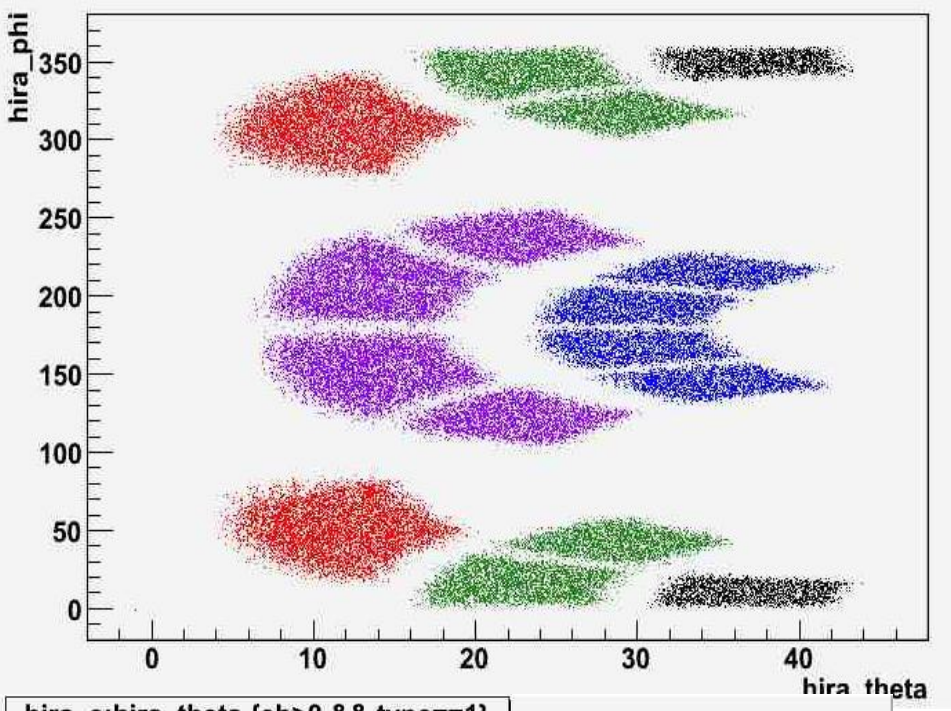


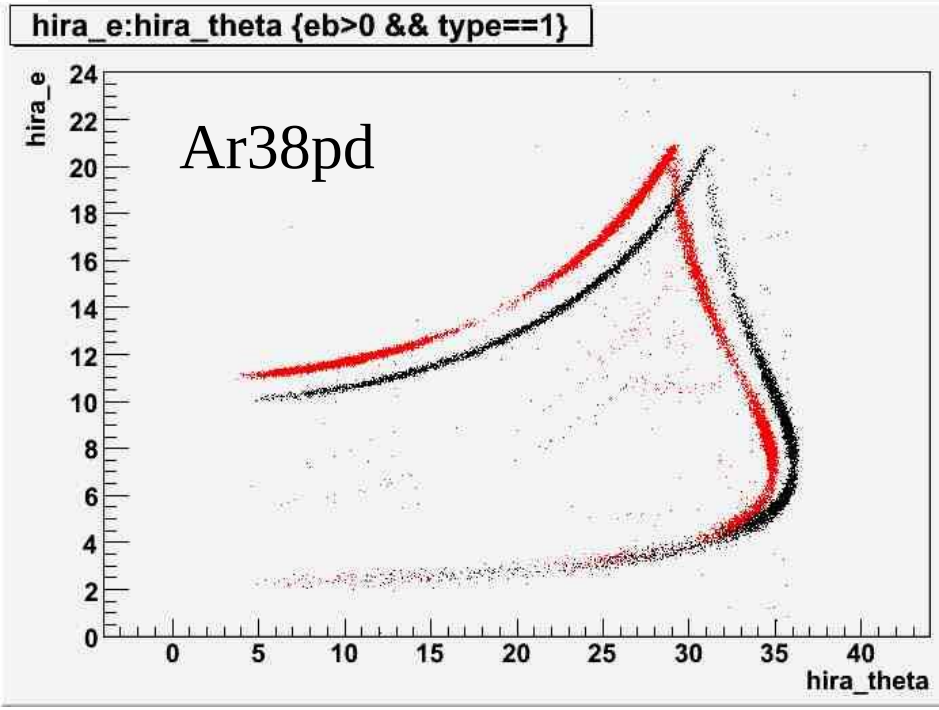

Ar40pd & Ar38pd at 35MeV/u
energy(MeV)
Lab−angle(deg)
Ar39 gs
Ar39 Ex=1.267
Ar37 gs
Ar37 Ex=1.409


p(40Ar,d), p(38Ar,d) 35MeV/A
d.c.s.(mb/sr)
CM−angle(deg)
39Ar g.s.
39Ar ex
37Ar g.s.
37Ar ex


d.c.s.(mb/sr)
Lab−angle(deg)
37Ar g.s.
37Ar ex


y
x


hira_phi
hira_theta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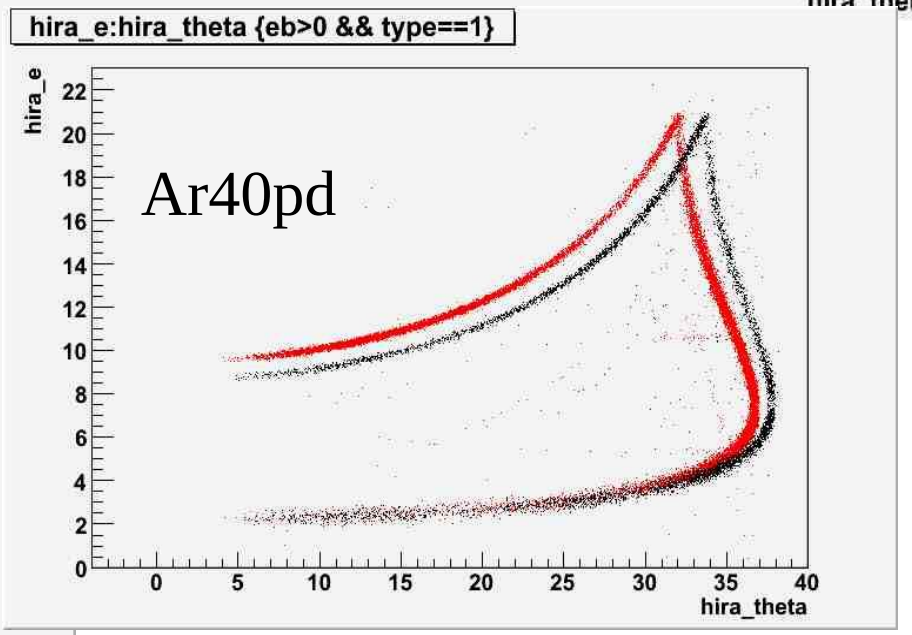
Ar38pd
hira_e
hira_theta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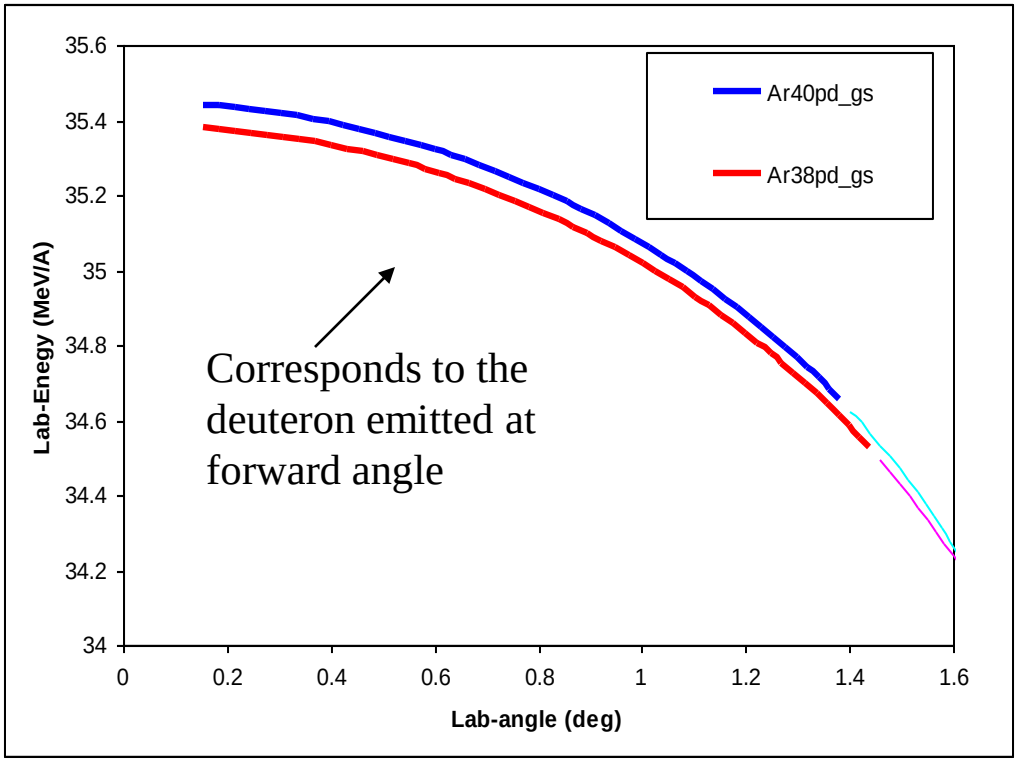
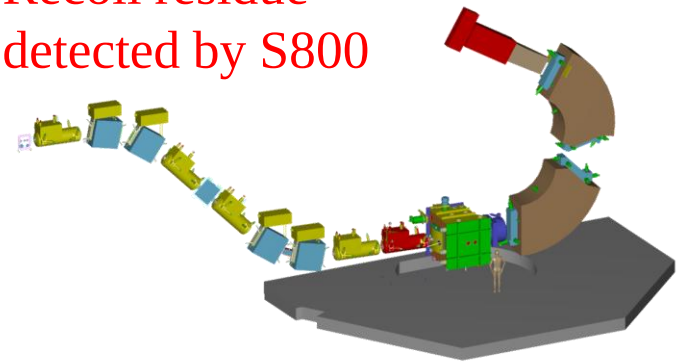
Ar40pd
hira_e
hira_theta



Recoil residue detected by S800



S800 Momentum acceptance = 5.8%

^{40}Ar beam :^{39}Ar →1.26% (range of Bρ)

^{38}Ar beam :^{37}Ar → 1.25%

^{40}Ar beam: Bρ=1.9096

^{39}Ar Bρ=1.8227-1.800
d: 7.97º-37.78º

^{38}Ar beam: Bρ=1.8141

^{37}Ar Bρ=1.7762-1.7542
d: 7.23º-36.09º