

Experimental Proposals

E040, E048, E055, E062, E077, E078, E082, E084

Experiments related to Mass Measurements: E040, E048, E055, E084

Experiments on Half-Life Measurements: E077, E078, E082

Direct Reactions in the ESR: E062

Experimental Proposals

E040 + E084, E048 + E055

- **Experiments related to mass measurements:**

E040: “Nuclear Astrophysics Studies at the FRS-ESR ...”

Spokesperson: H. Schatz, MSU, U.S.A. / GSI Contact Person: Yu.A. Litvinov, GSI

Year of Approval: 1998

Shifts: approved 63(21) / left 20(0)

E084: “Mass measurements of neutron-deficient short-lived nuclides”

Spokesperson: R.K. Knöbel, GSI

Year of Approval: 2008

Shifts: approved 42(0) / left 42(0)

E048: “Exploring Long-Living K-Isomers via Schottky-Mass-Spectrometry at the ESR”

Spokesperson: P.M. Walker, Uni. Surrey, U.K. / GSI Contact Person: Yu.A. Litvinov, GSI

Year of Approval: 1999

Shifts: approved 27(0) / left 10(0)

E055: “Experimental program for direct mass measurements at FRS-ESR ...”

Spokesperson: C. Scheidenberger, GSI / GSI Contact Person: Yu.A. Litvinov, GSI

Year of Approval: 2002

Shifts: approved ~90(0) / left 10(0)

Physics Motivation

**Masses of more than 1100
Nuclides were measured**

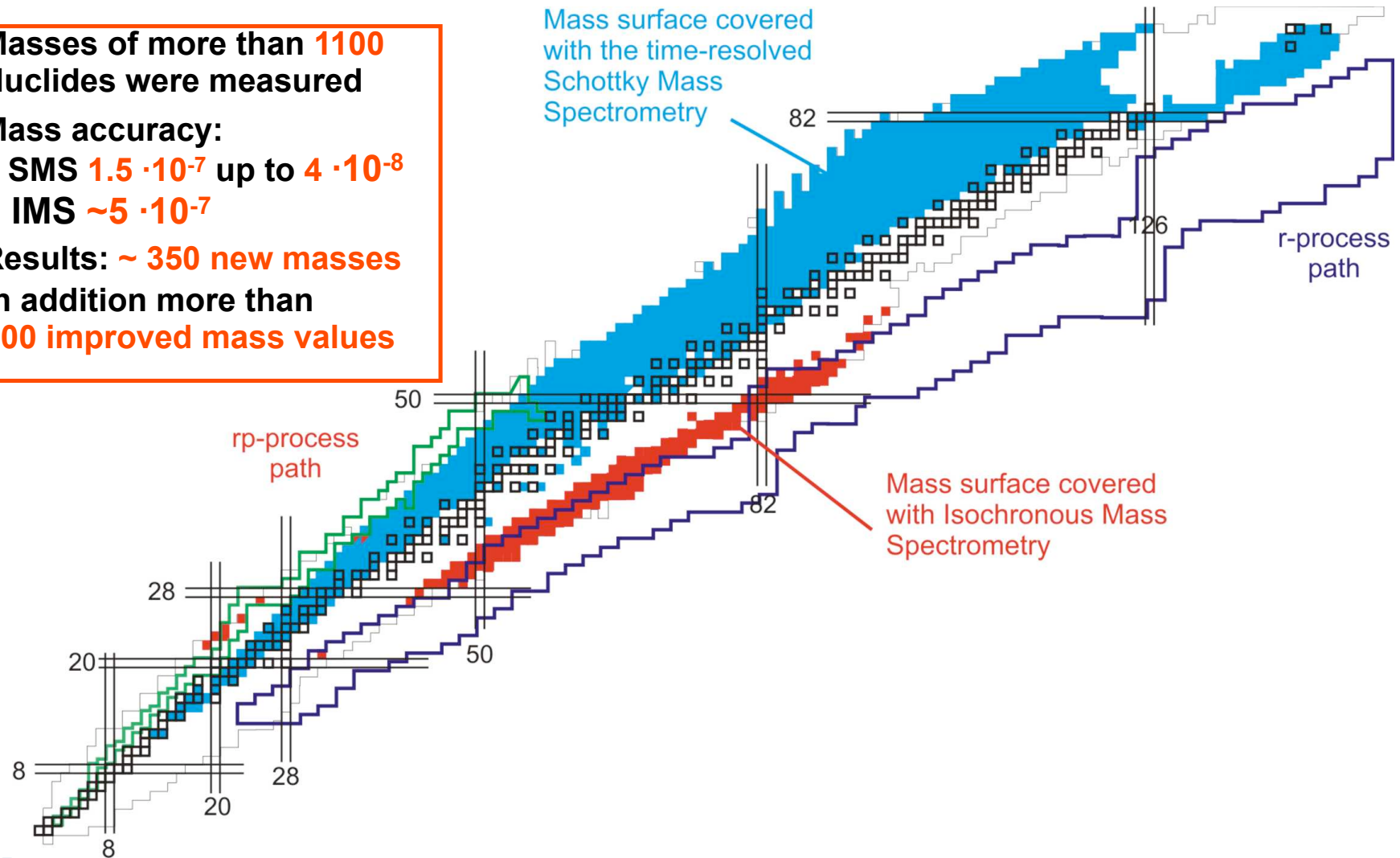
Mass accuracy:

SMS $1.5 \cdot 10^{-7}$ up to $4 \cdot 10^{-8}$

IMS $\sim 5 \cdot 10^{-7}$

Results: ~ 350 new masses

**In addition more than
300 improved mass values**



Setup

- FRS focal planes equipment:
Vacuum, Current Grids, Target
- Is there any new or non-standard equipment required?
Slits moving over the middle
- Is there a modification or a new DAQ required?
NO
- What is the requested primary beam and intensity?
 ^{181}Ta , $5 \cdot 10^9$ particles/spill
 ^{107}Ag , $2 \cdot 10^9$ particles/spill
- How many shifts are requested for 2009?
E040+E084 = 62 shifts
E048+E055 = 20 shifts

Experimental Proposals

E078, E077 + E082

- **Experiments related to half-life measurements:**

E078: “Influence of hyperfine interaction on the nuclear electron capture decay”

Spokesperson: Yu.A. Litvinov, GSI

GSI Contact Person: ----

Year of Approval: 2007 & 2008

Shifts: approved 21(0) / left 21(0)

E077 & E082: “Single-Ion Spectroscopy of Two-Body Beta-Decays”

Spokesperson: Yu.A. Litvinov, GSI, F. Bosch, GSI

GSI Contact Person: ----

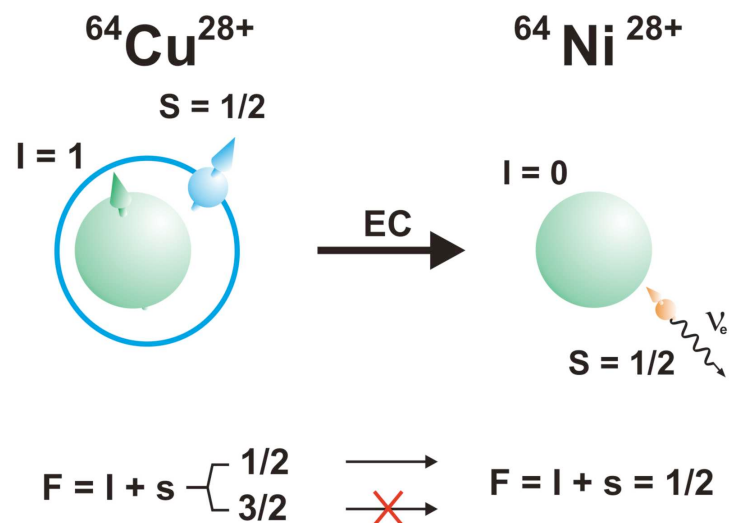
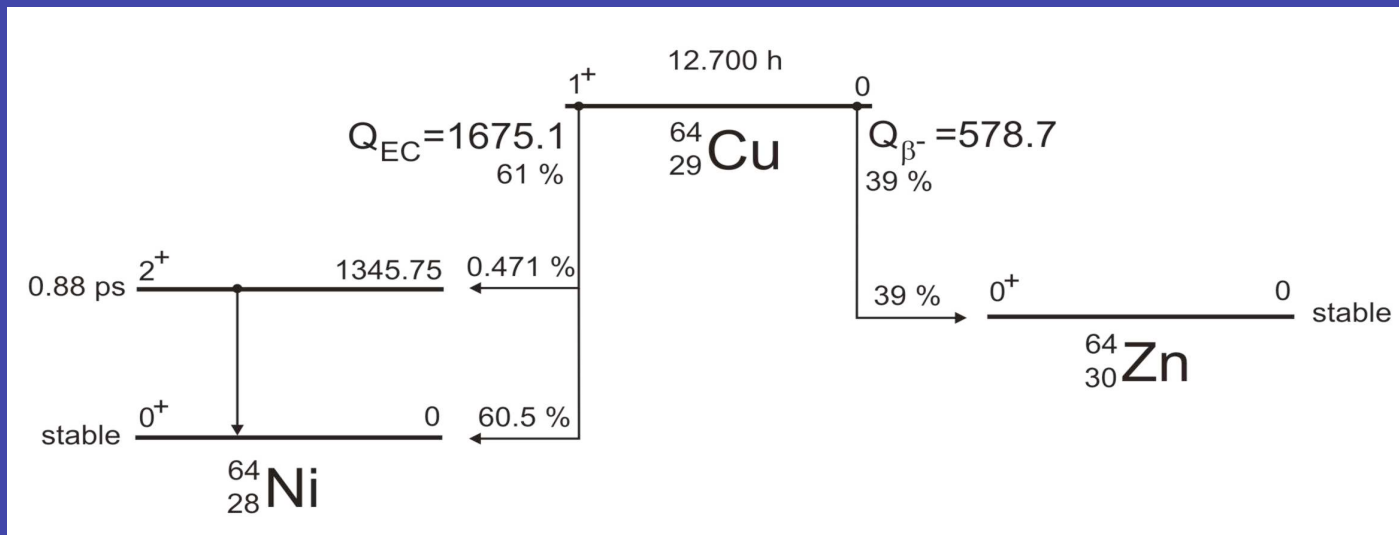
Year of Approval: 2006

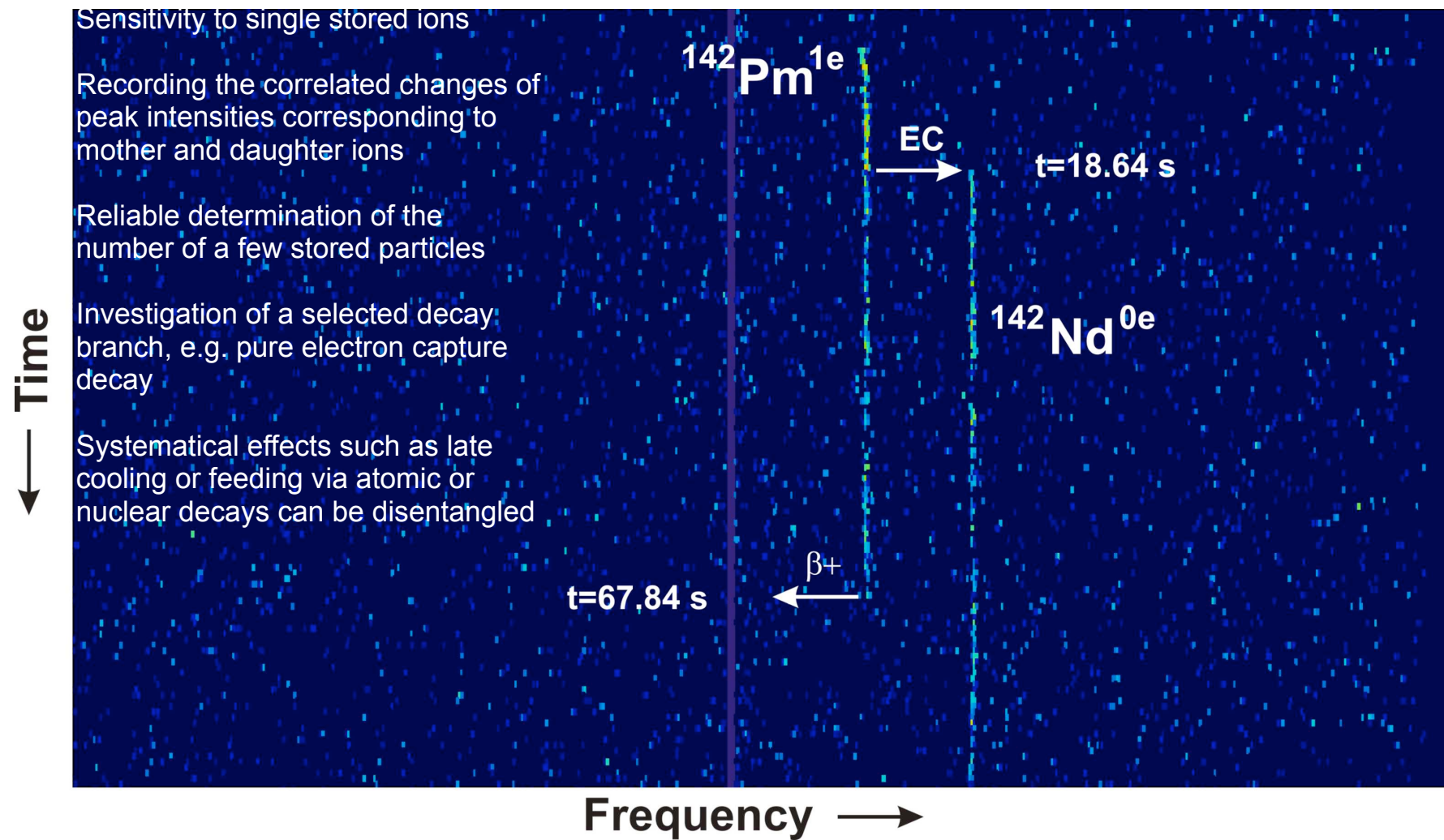
Shifts: approved 75(0) + 100(0) / left 62(0)

Next Step

B.M. Dodsworth et al., Phys. Rev. 142 (1966) 638.

$$\mu(^{64}\text{Cu}) = -0.217(2) \mu_N$$





Setup

- FRS focal planes equipment
Vacuum, CG, Target, S2-wedge (731 mg/cm² Al disk)
- Is there any new or non-standard equipment required?
FRS-No, ESR-New Schottky Pick-Ups
- Is there a modification or a new DAQ required?
No
- What is the requested primary beam and intensity?
E078: ⁶⁵Cu, $1 \cdot 10^{10}$ particles/spill
E077+E082: (?) ¹⁵²Sm, $5 \cdot 10^8$ particles/spill
- How many shifts are requested for 2009?
E078 = 0 shifts
E077+E082 = (?) 62 shifts

Experimental Proposals

E062

- **Experiments related to in-ring reactions:**

E062: “ESR measurements of proton-induced reaction rates in the Gamow window of the astrophysical p process”

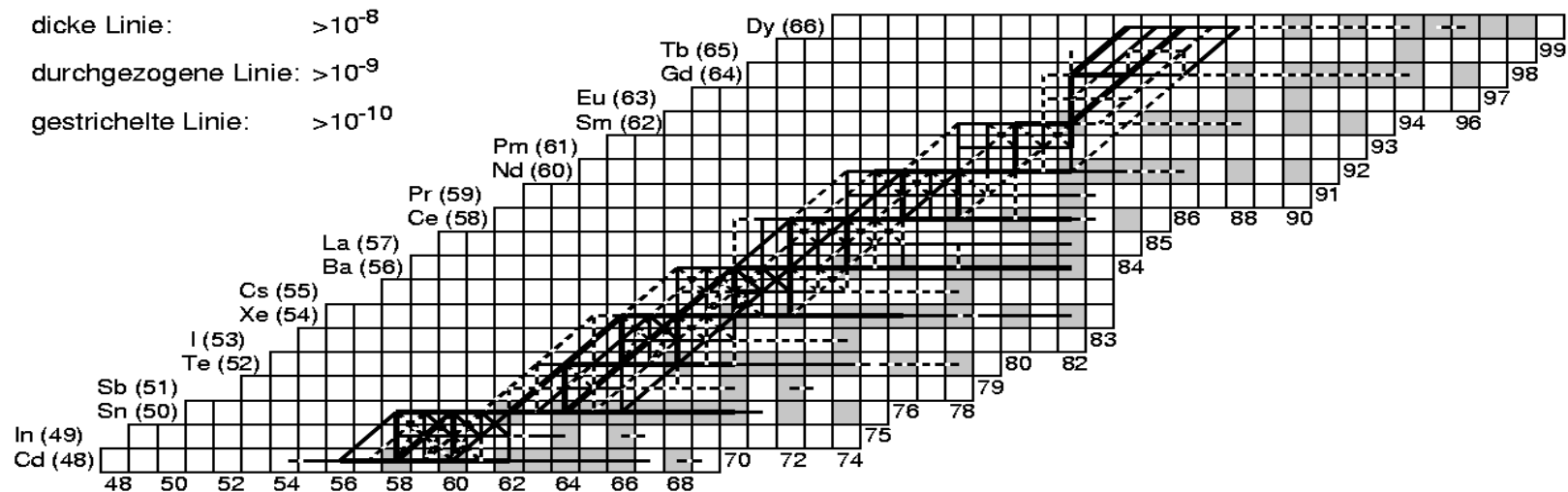
Spokesperson: M. Heil, GSI / GSI Contact Person: Yu.A. Litvinov, GSI

Year of Approval: 2004

Shifts: approved 21(0) / left 21(0)

New proposal is being prepared for the PAC in spring 2009

p-process calculations



About 1500 nuclei involved
More than 10000 reactions

Lack of experimental information on (p, γ) and (α, γ)

Reaction rates from theory are very uncertain even for stable nuclides

$^{92,94}\text{Mo}$ and $^{96,98}\text{Ru}$ anomaly

Setup

- FRS focal planes equipment
no FRS
ESR: Deceleration in the ESR, Gas-Jet Target
- Is there any new or non-standard equipment required?
No
- Is there a modification or a new DAQ required?
No
- What is the requested primary beam and intensity?
 ^{96}Ru , $5 \cdot 10^8$ particles/spill
- How many shifts are requested for 2008?
E062 : 21 shifts

Experimental Proposals

E040, E048, E055, E062, E077, E078, E082, E084

$E040 + E048, E055 + E084 = 82$ shifts

$E062 = 21$ shifts (SIS-ESR)

$E078 = 0$ shifts

$E077 + E082 = (?) 62$ shifts