Challenges with KoRIA

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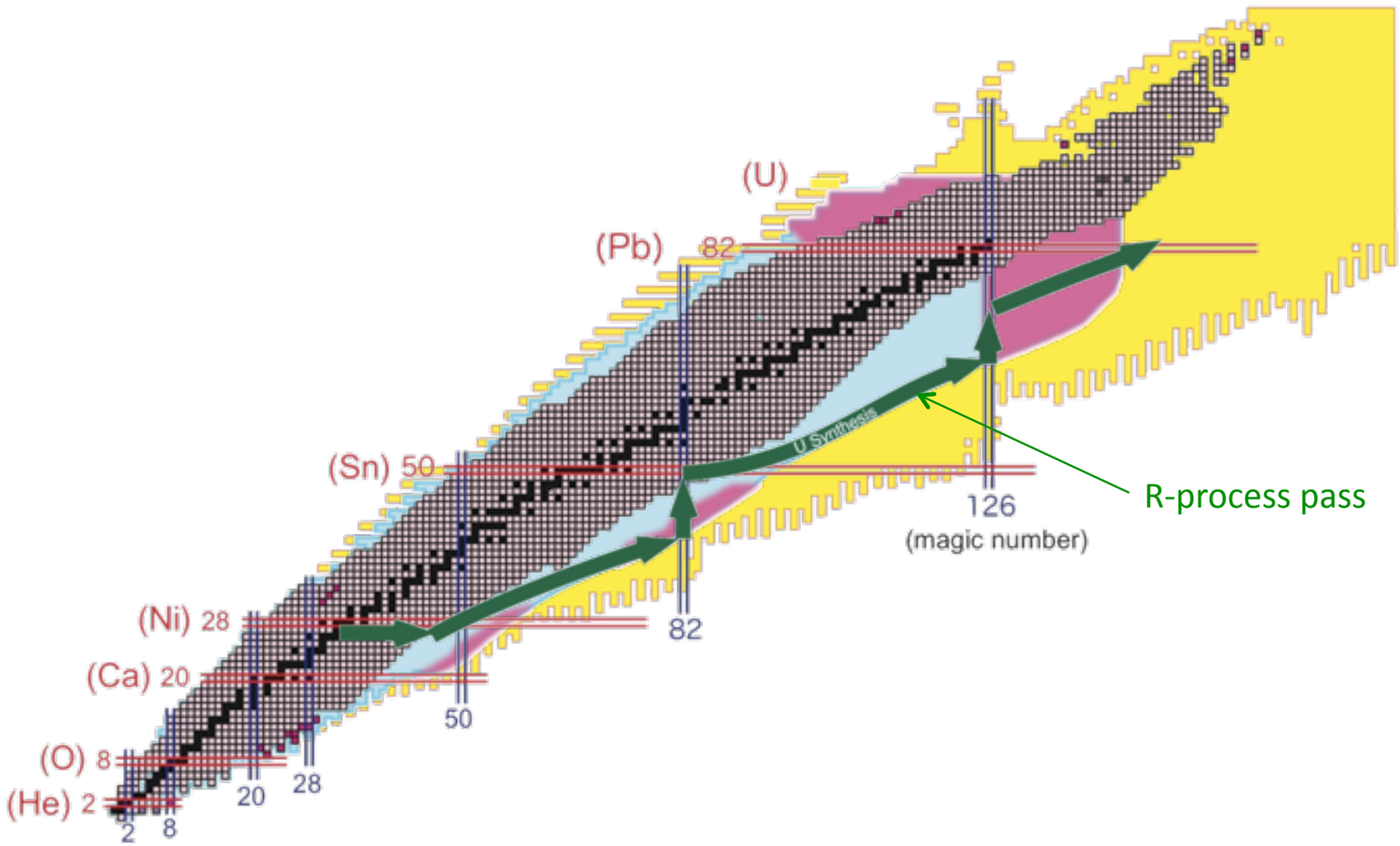
Feb. 23, 2009

Science with RI beam

- Nuclear Structure
  - Super Heavy Elements (SHE)
- Nuclear Astrophysics
- Fundamental Symmetries
- Other Scientific Applications

Chart of Nuclides



Nuclear Structure

- Neutron Rich Nuclei
- Neutron Skins
- Shells and Shapes
- Neutron Halo
- Drip Lines (neutron/proton side)

Nuclear Astrophysics

- The Origin of heavy elements
- Neutron Stars
- Explosive Nucleosynthesis
  - Supernova, GRB etc.

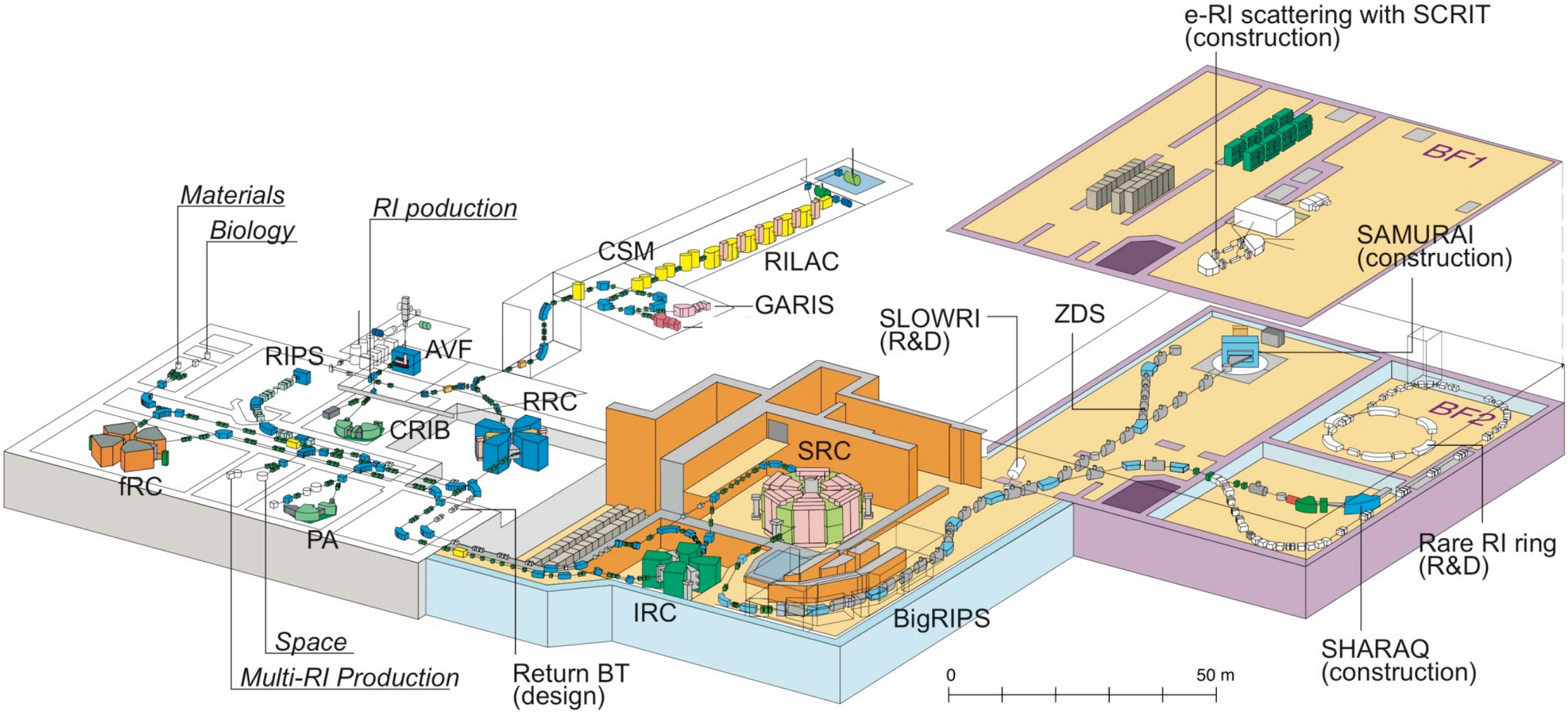
Other Applications

- Fundamental Symmetries
  - EDM measurement with RI's
- Medical Applications
- Material Science
  - beta-NMR

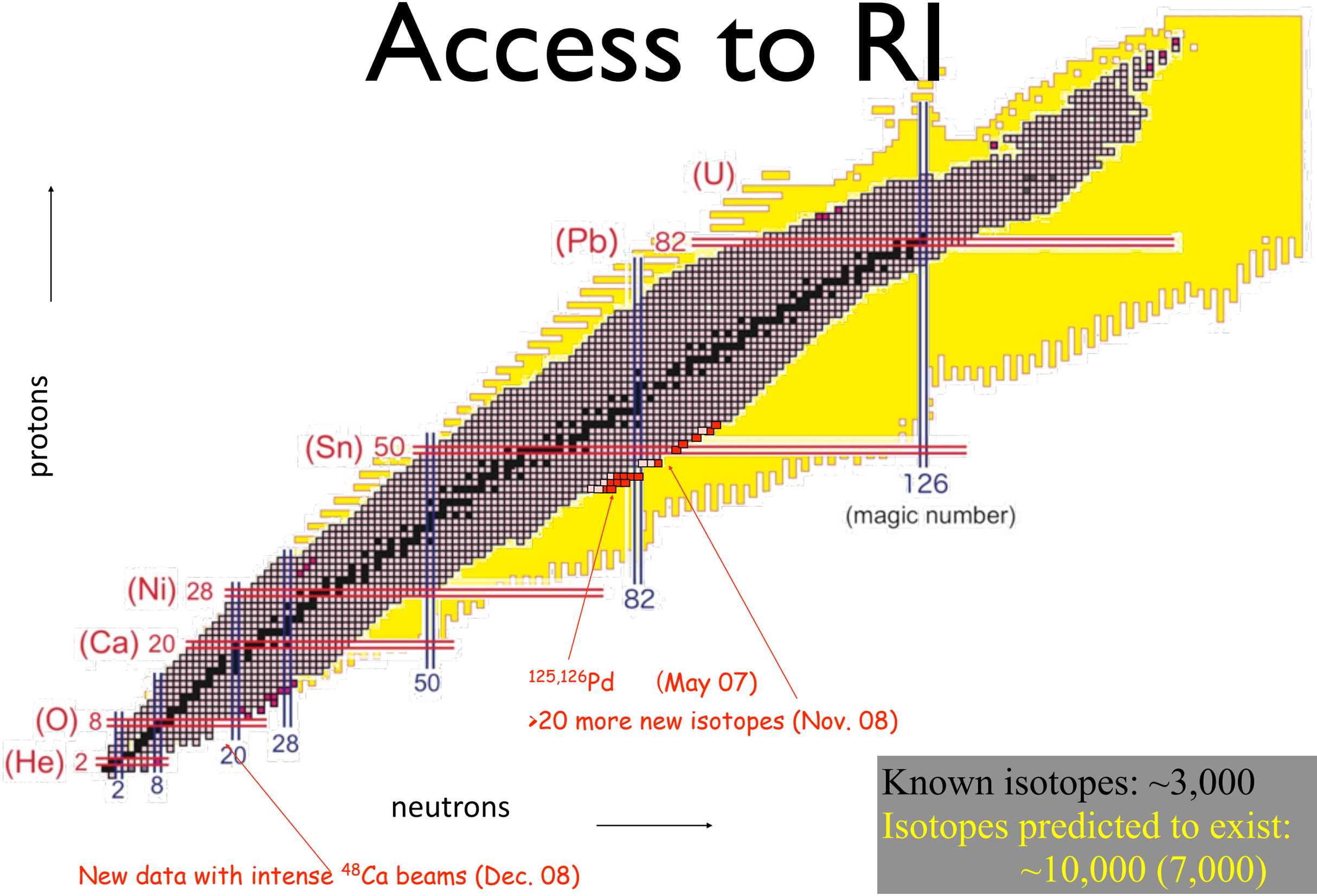
Comparison of Future RI Facilities

	RIA	FRIB	RIBF	FAIR	SPIRAL2
Energy (MeV/A)	400	200	350	2000	14.5
Power (kW)	400	400	100	100	200
Main Acc	SC Linac	SC Linac	SC Cyclotron	Synchrotron	SC Linac
Characteristics	1. Projectile Fragmentation 2. Projectile/ Target fission 3. Target fragmentation/ spallation 4. ISOL 5. Fast beam fragmentation separation	SAME as RIA	Fragmentation	1. Fragmentation 2. e-RI scattering 3. Fixed target RHI collision 4. Anti-proton 5. Plasma Physics 6. Atomic Physics	1. Fragmentation 2. ISOL

RIBF at RIKEN

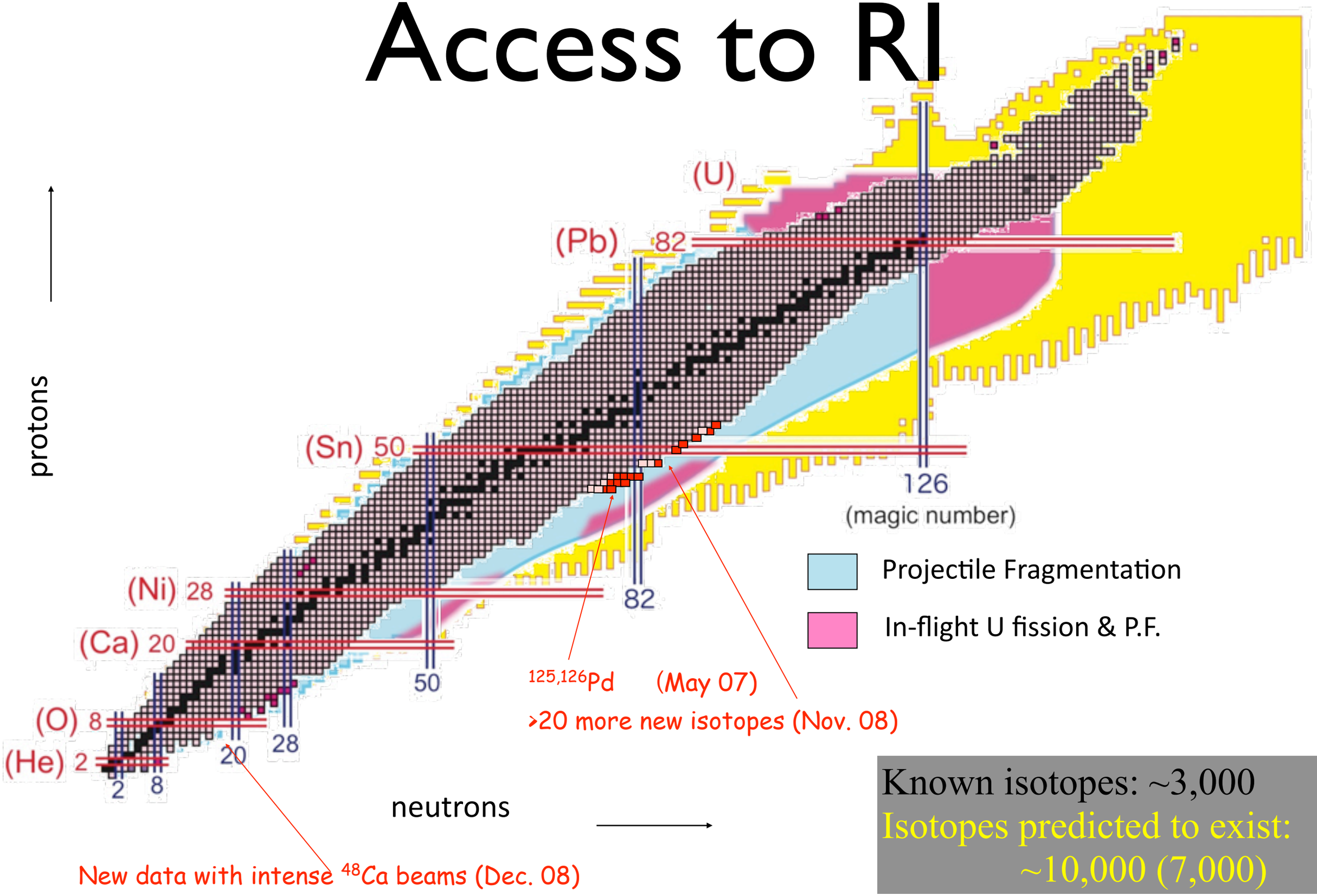


Access to RI



Known isotopes: ~3,000
Isotopes predicted to exist:
~10,000 (7,000)

Access to RI



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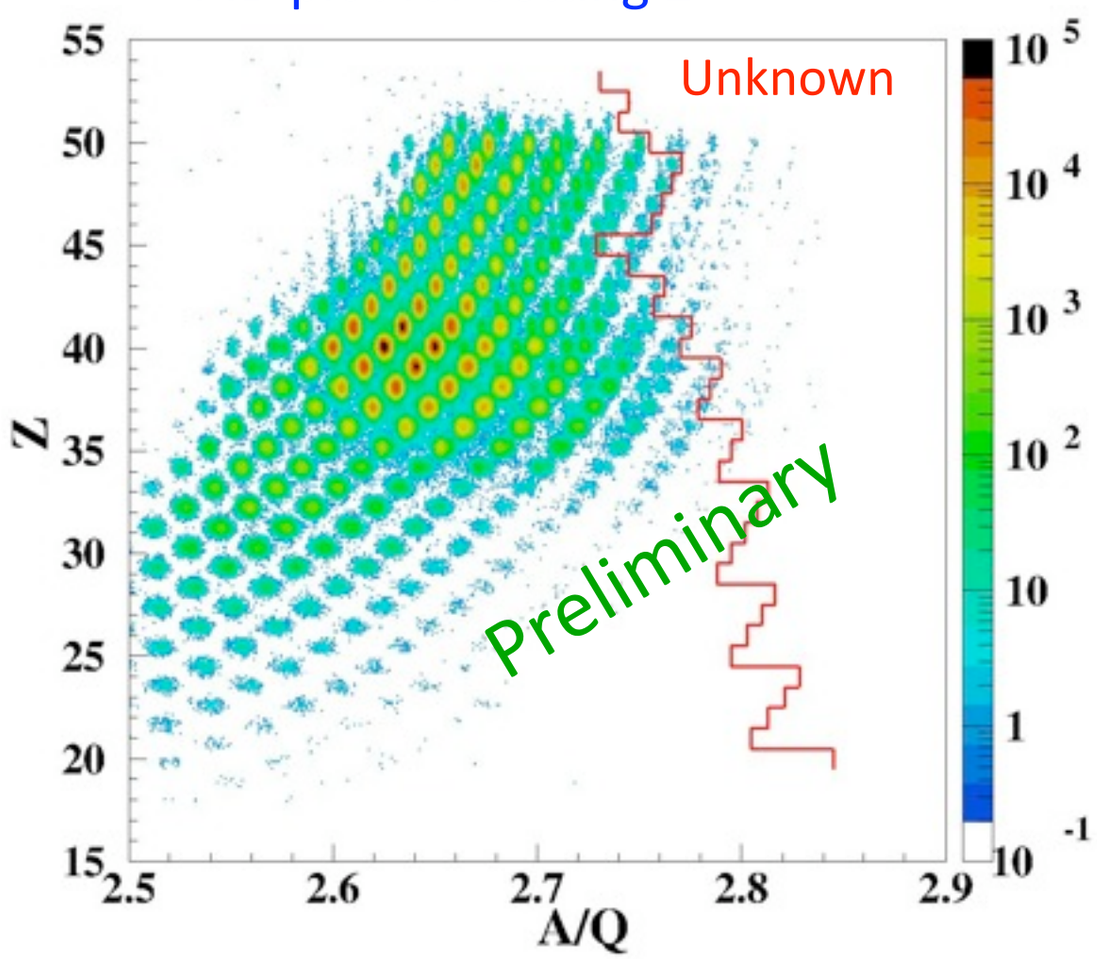
New isotope search using a ^{238}U beam at BigRIPS

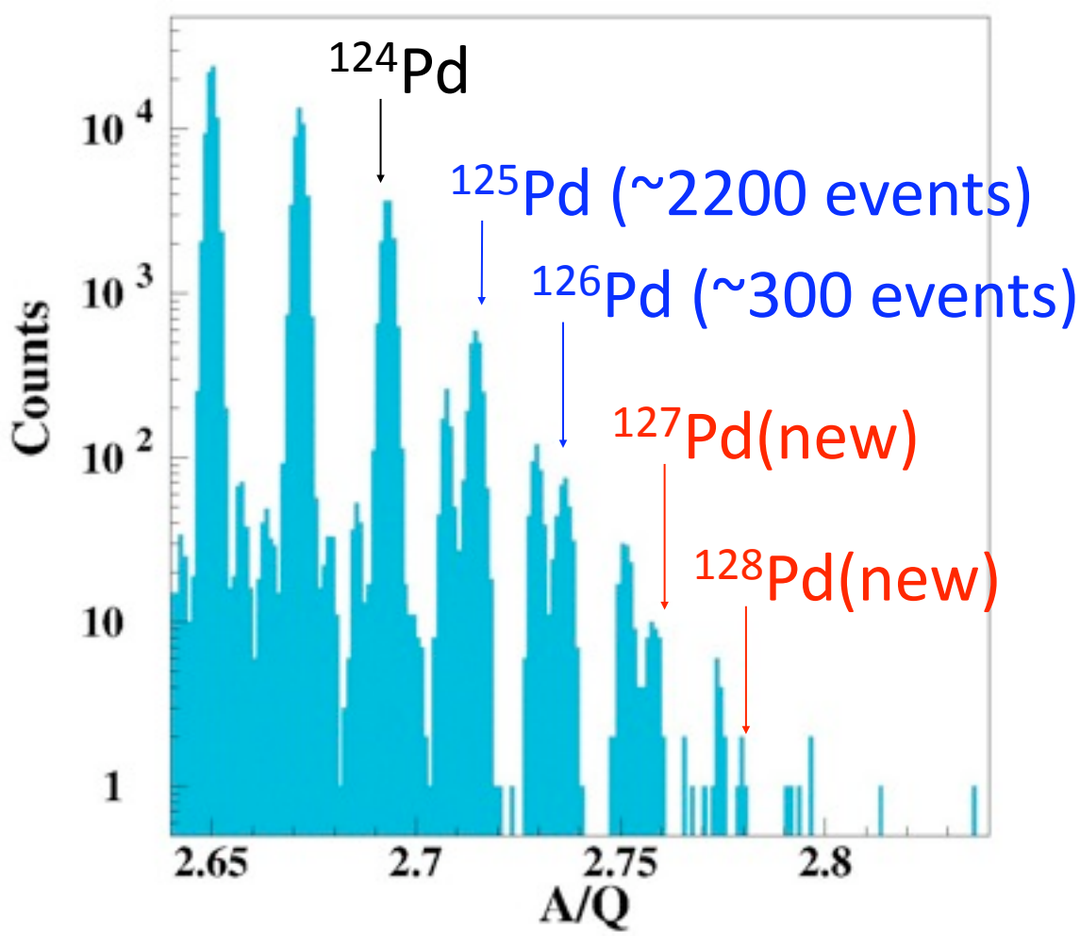
Nov. 2008

Setting 1) $^{238}U^{86+}$ 345 MeV/u + Be, Bρ01 = 7.9015 Tm,
with an F1 degrader, targeting Z=30 region.
Setting 2) $^{238}U^{86+}$ 345 MeV/u + Be, Bρ01 = 7.931 Tm,
with an F1 degrader, targeting Z=40 region.
Setting 3) $^{238}U^{86+}$ 345 MeV/u + Pb (with Al backing), Bρ01 = 7.706 Tm,
with F1 and F5 degraders, targeting Z=50 region.

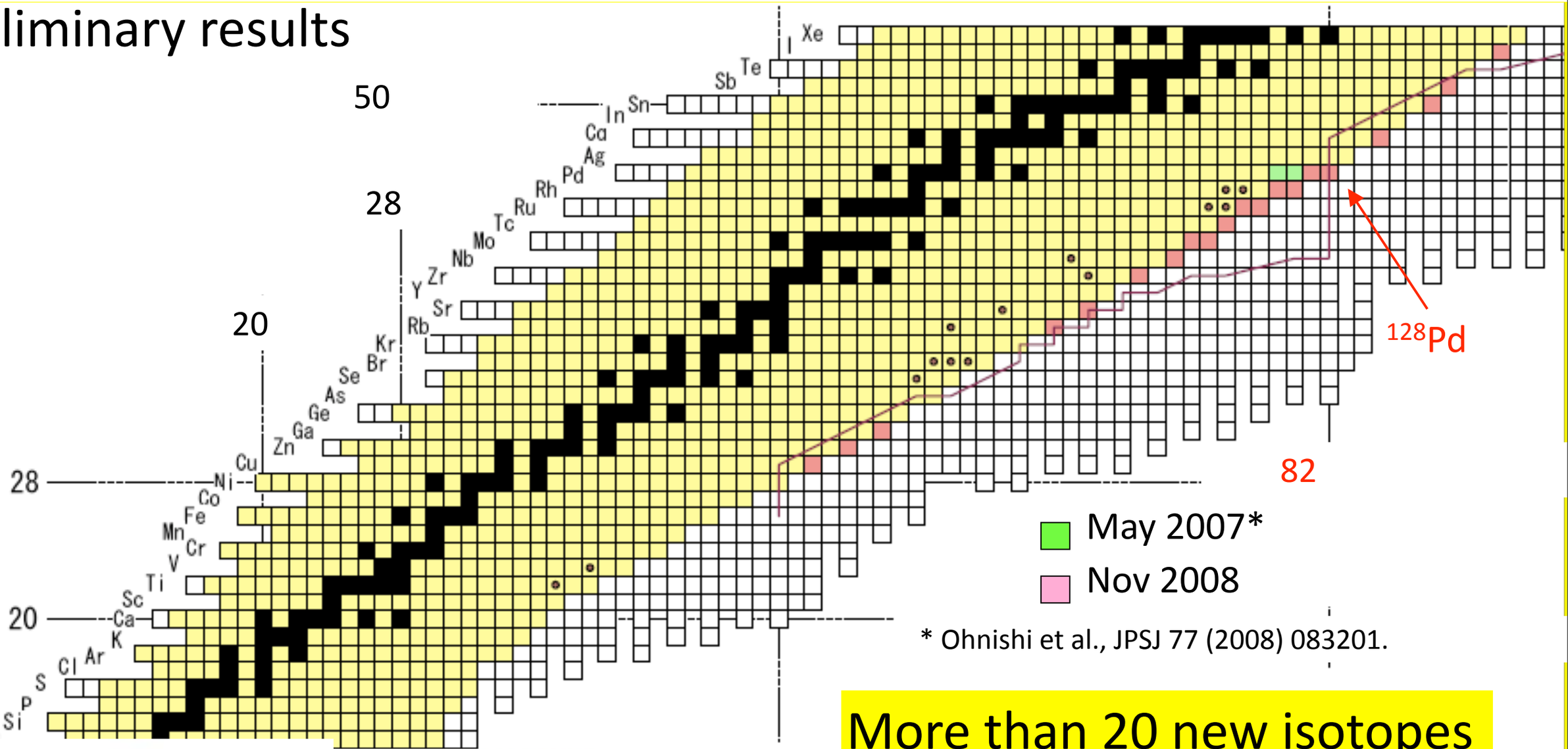
PID plot for setting 2



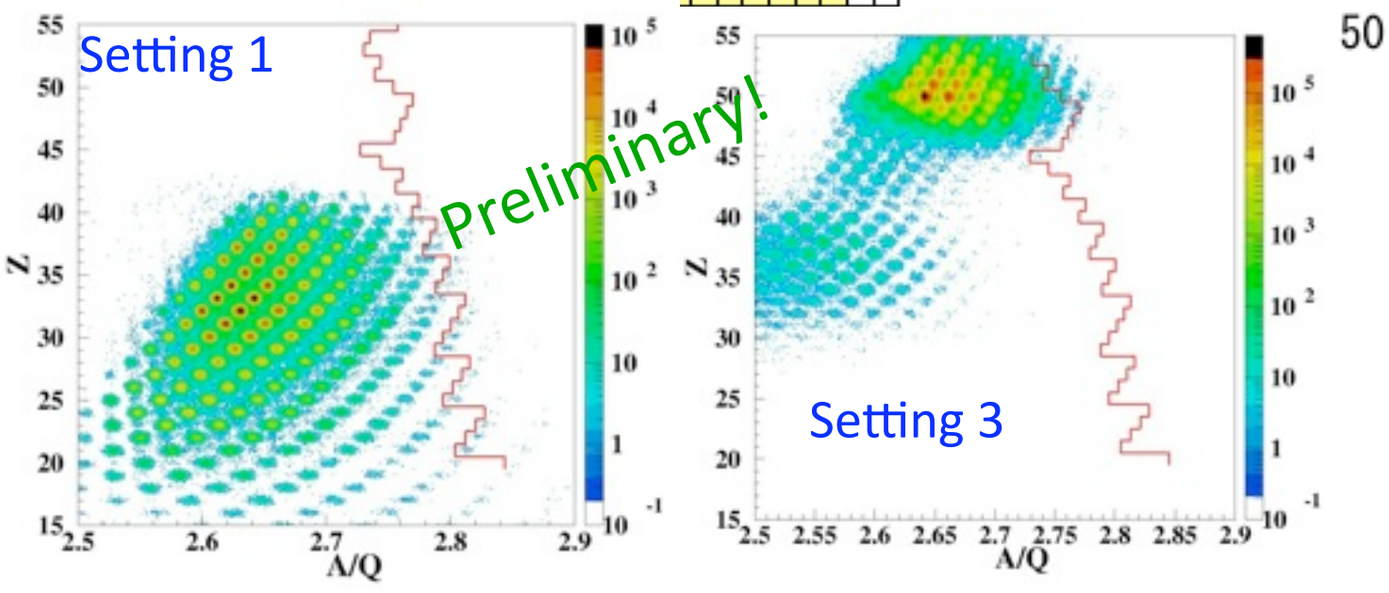
Pd (Z=46)



Preliminary results



* Ohnishi et al., JPSJ 77 (2008) 083201.



More than 20 new isotopes

U-beam intensity (on average)
~0.28 pnA (1.75 x 10^9 pps)

~40 times larger than in 2007, which was ~4 x 10^7 pps.

Tasks for KoRIA

- Define **unique** physics goals
  - Not an easy task. Easier said than done.
- Design unique **World Class** facility
- Build the machine **in time**
- Daunting task for nuclear physics community for the next 10 to 15 years