

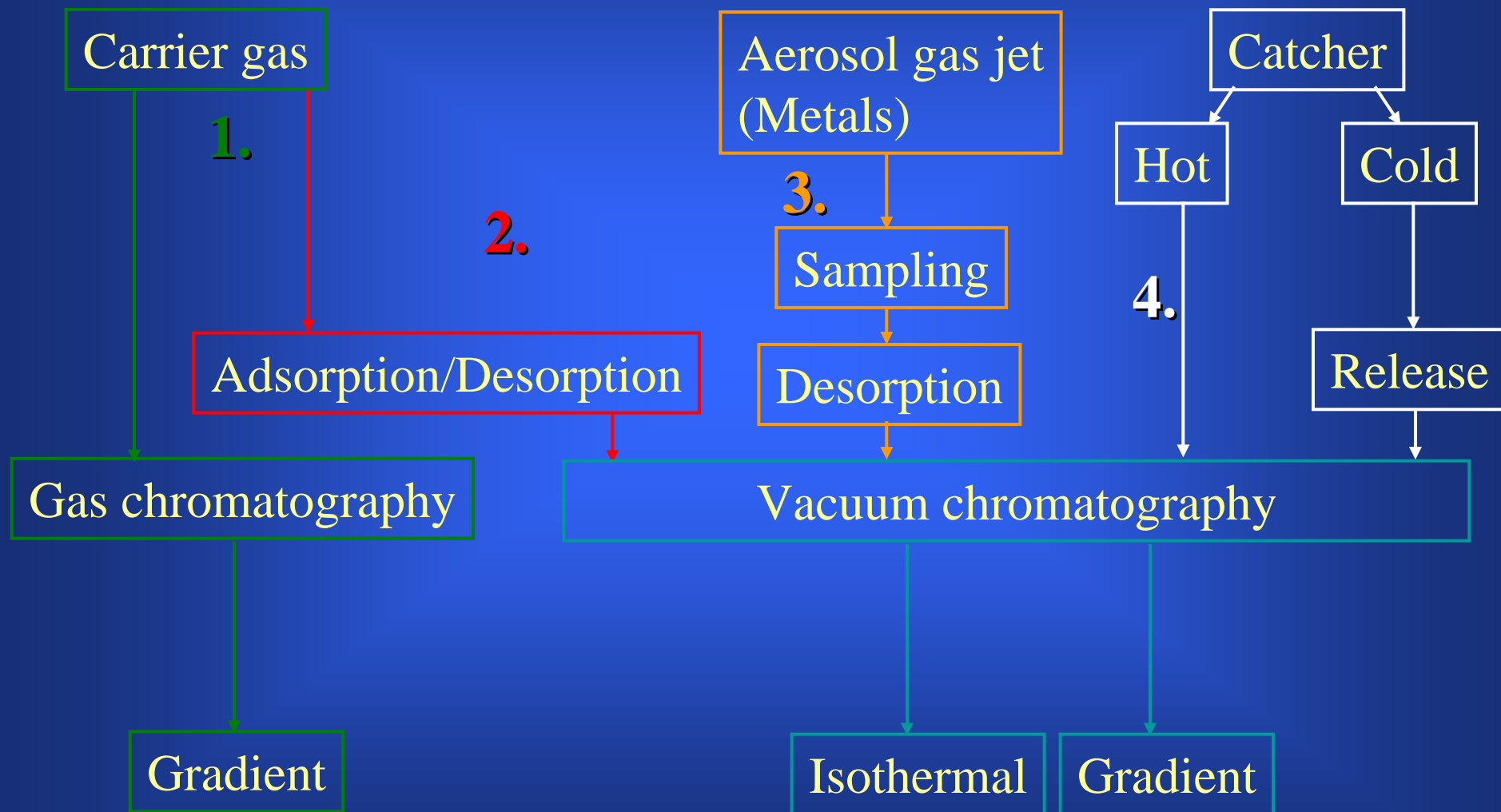
Gas Phase Chemistry @TASCA

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Transactinides

Gas phase chemistry @ Recoil Separator



Method 1: Elemental state

E112/Hg,Rn
E114/Rn
E117/At
E118/Rn

Carrier gas: He/Ar

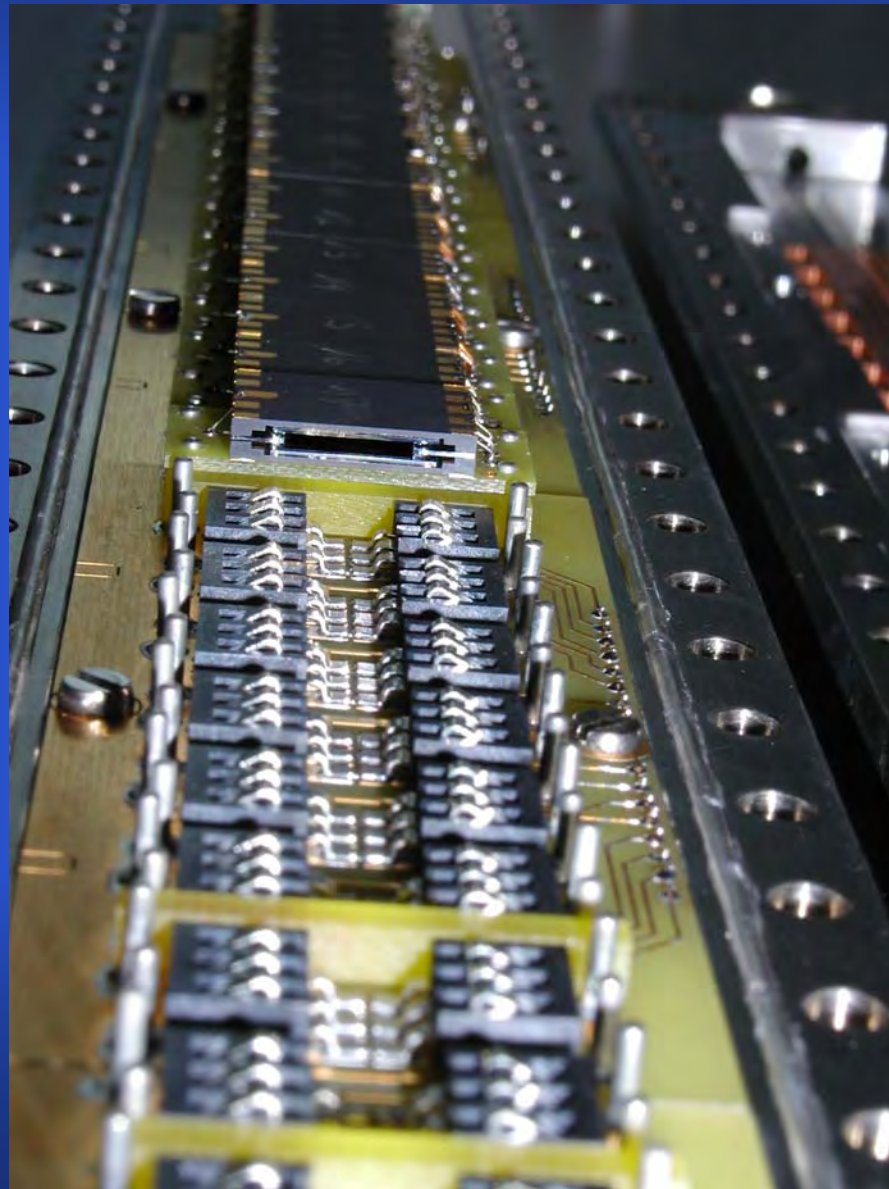
Gas chromatography

Gradient COLD
(Au)

existing

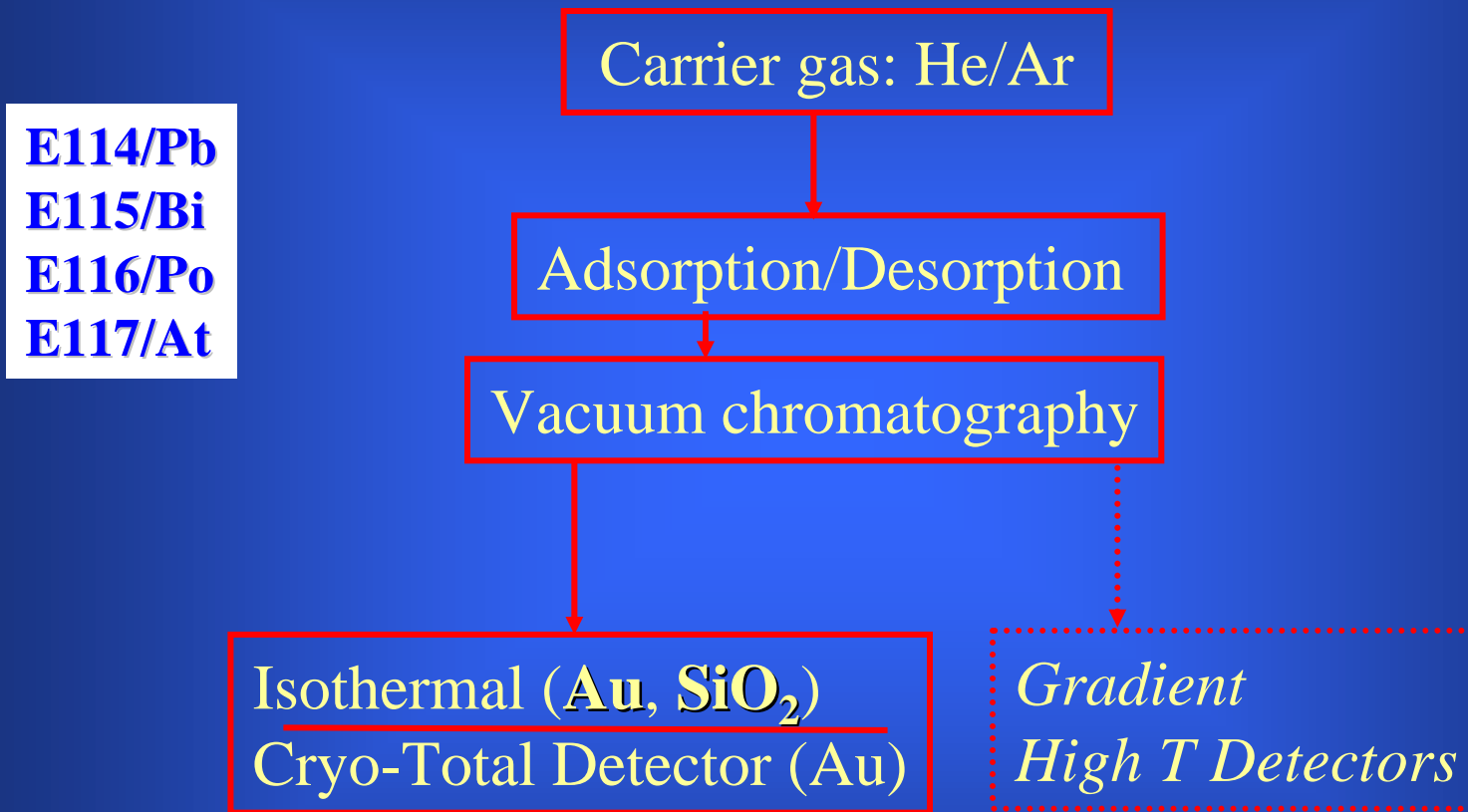
Small recoil stopping volume!
→ Small focal plane

Cryo On-line Detector (COLD)



Method 2: Adsorber/Desorber

Vacuum chromatography of the elemental state

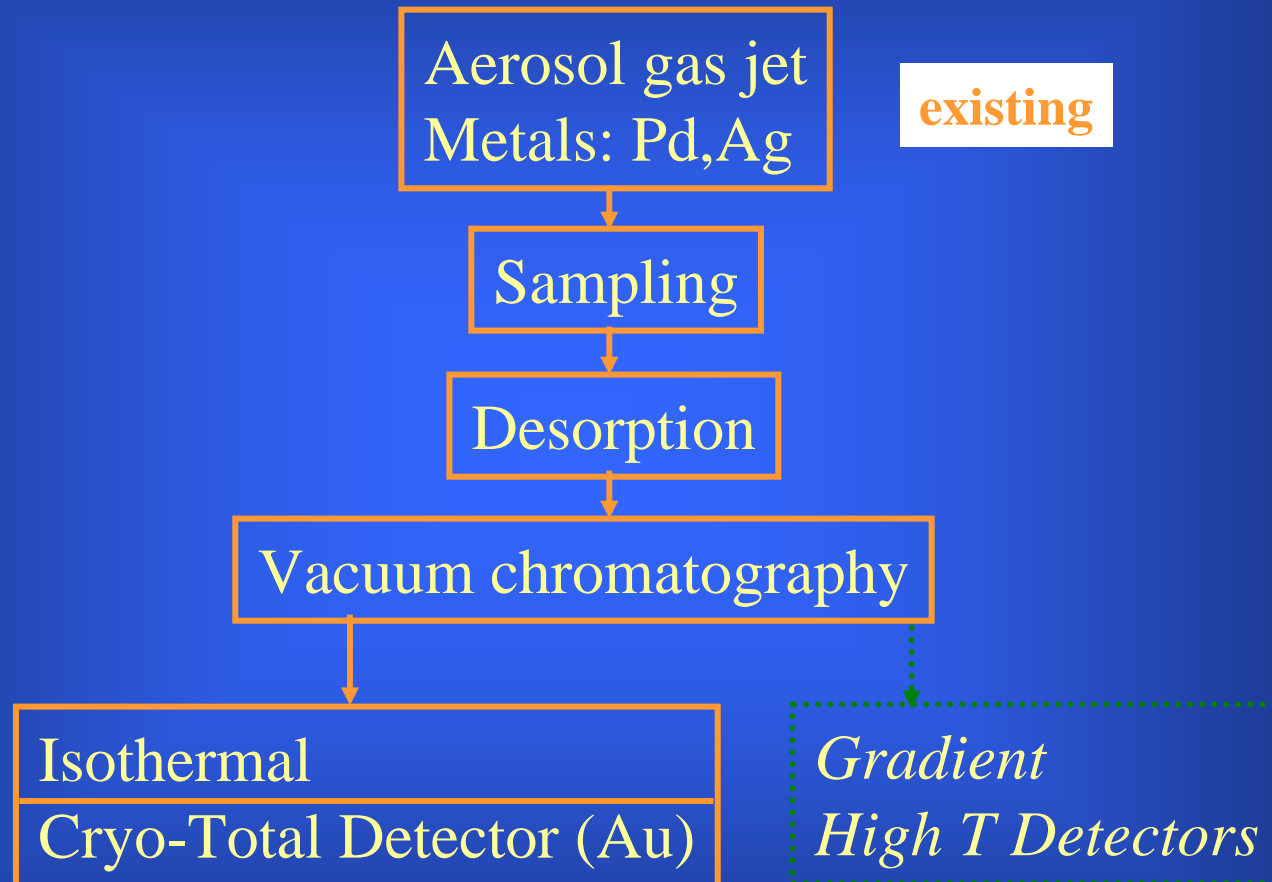


Small recoil stopping volume!
→ Small focal plane

Method 3: Aerosol gas jet

Vacuum chromatography of the elemental state

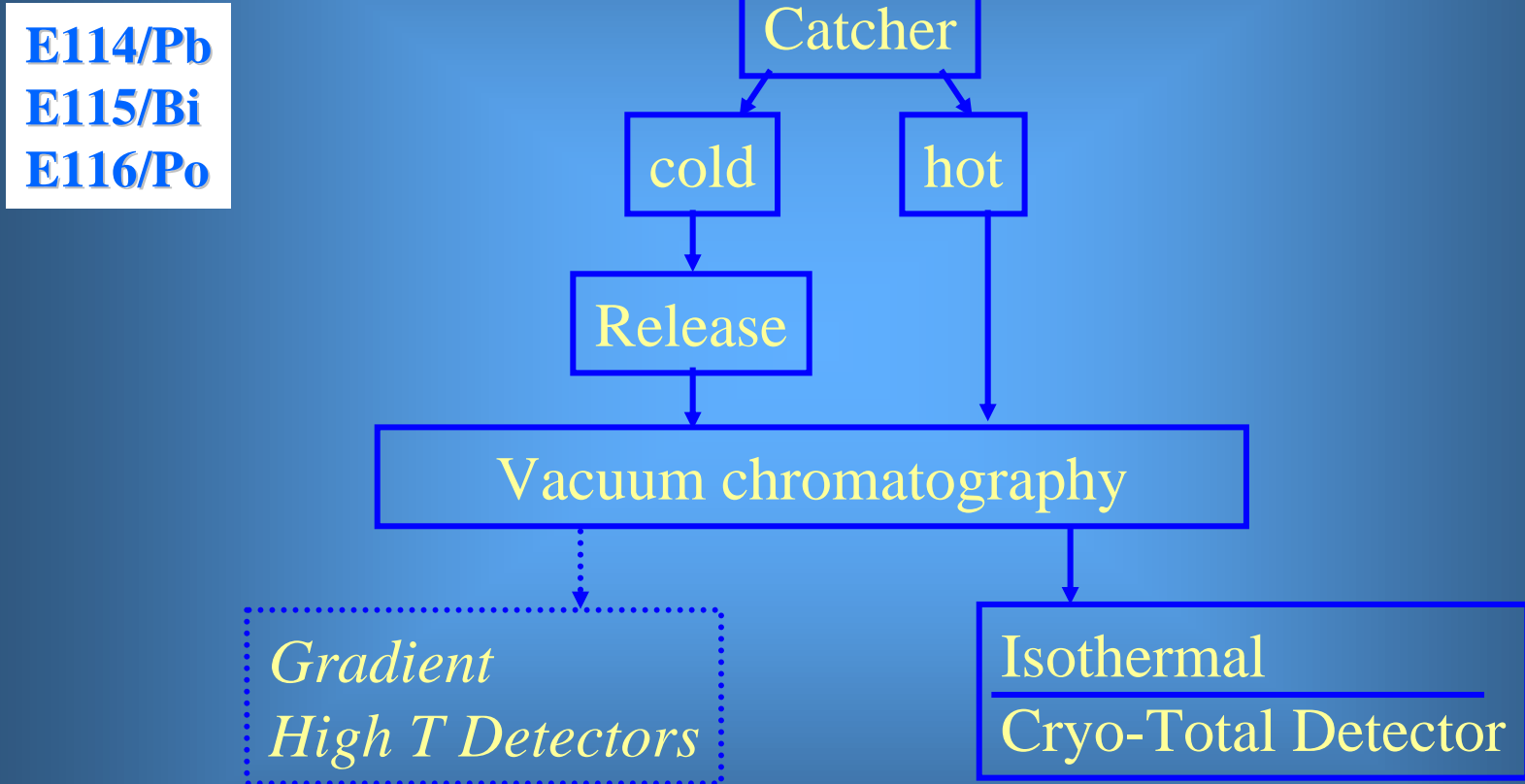
E114/Pb
E115/Bi
E116/Po
E117/At



Small recoil stopping volume!
→ **Small focal plane**

Method 4: Catcher

Vacuum chromatography of the elemental state

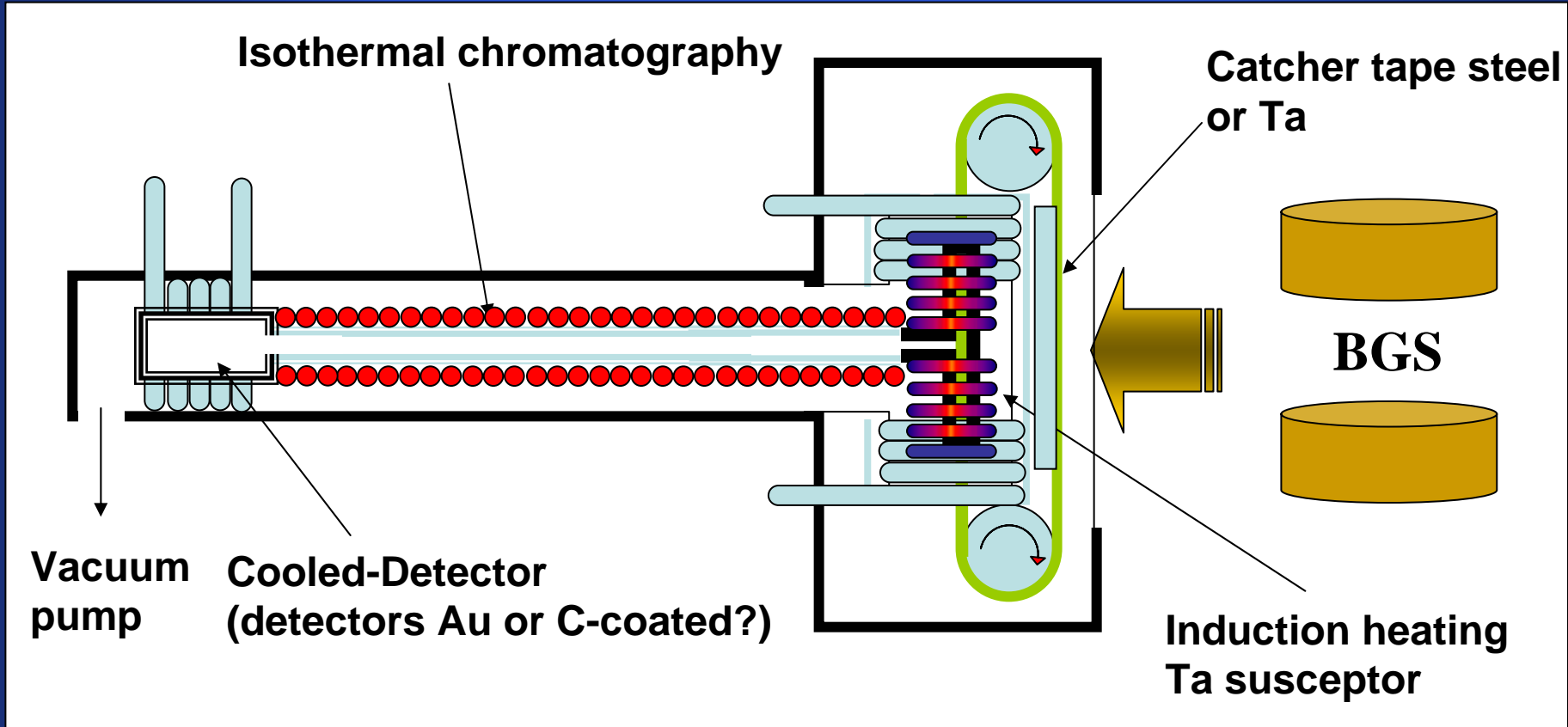


Release time??

Method 4: Proposal Catcher-Tape-System

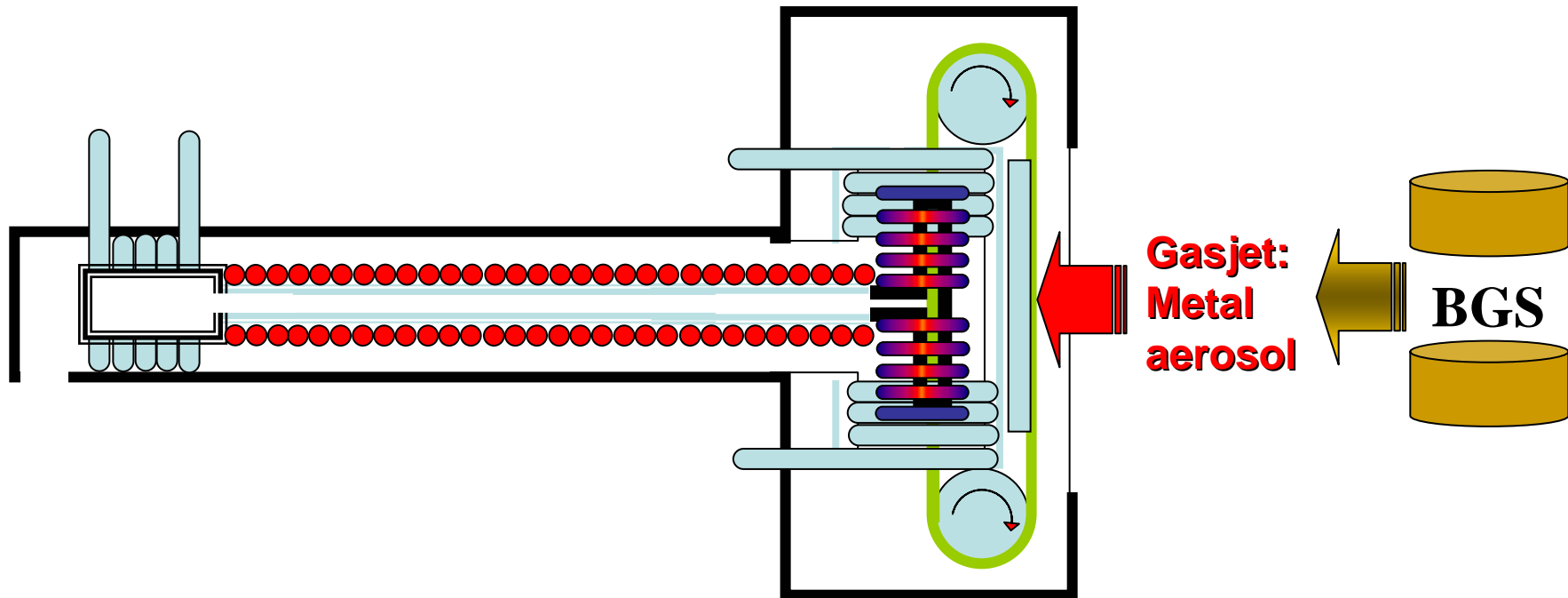
Development in a PSI-University Bern-LBNL Collaboration

Tests @ BGS 2005 approved by SNF



Method 4: Plan B

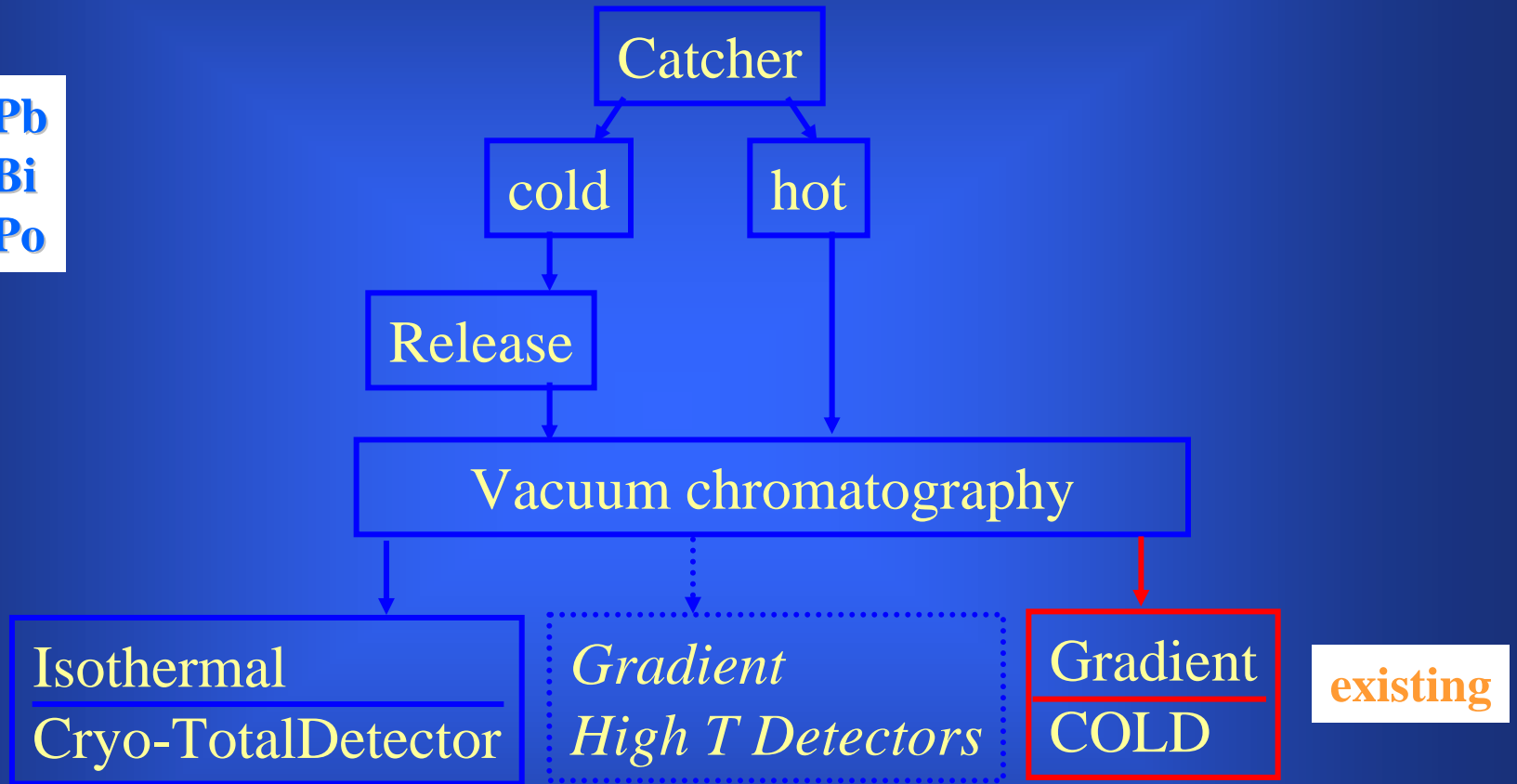
Development in a PSI/Uni Bern–LBNL collaboration
Tests @ BGS 2005 approved by SNF/PSI



Method 4: Catcher

Vacuum chromatography of the elemental state

E114/Pb
E115/Bi
E116/Po



E112/Hg,Rn
E114/Rn
E117/At
E118/Rn

Method X: Vacuum chromatography of compounds

- Mt/Ir** – oxides/acids
- 110/Pt** – halogenides, hexahalogeno acid, adduct with $\text{FeCl}_3/\text{AlCl}_3$
- 111/Au** – halogenides, tetrahalogeno acid, adduct with $\text{FeCl}_3/\text{AlCl}_3$
- 112/Hg** – oxide, halogenides, metal organics
- 113/Tl** – hydroxide, metal organics
- 114/Pb** – halogenides, metal organics
- 115/Bi** – hydroxide
- 117/At** – oxide/ hydroxide
- 119/Fr** – halogenides

Reaction at 10^{-3-4} mbar / T \uparrow

Vacuum Chromatography

^{212}Po -Production in the reaction $^{48}\text{Ca}+^{238}\text{U}$

$\Pi_{\text{eff}}(\text{Rn})$	$\Sigma^{238}\text{U}$	$\Sigma^{48}\text{Ca}$	$\#^{212}\text{Po}$
~ 0.3	$2.00\text{E}+18$	$2.80\text{E}+18$	$1.94\text{E}+06$

$$\sigma < 2 \mu\text{b}$$

Dream Separator for Future Transactinide Gas Phase Chemistry

- ~~✗~~ Separation of 10^{4-6} from transfer products: Masses 211-260
- ~~✗~~ Separation efficiency $> 50\%$
- ~~✗~~ Focal plane size $< 5 \times 5$ cm
- ~~✗~~ Target thickness $\sim 500-600 \mu\text{g}/\text{cm}^2$