



LABORATORY FOR RADIOCHEMISTRY AND
ENVIRONMENTAL CHEMISTRY OF THE UNIVERSITY OF
BERN AND THE PAUL SCHERRER INSTITUTE



Prospects of an IVO chemistry experiment with element 112

S. Soverna^{1,2}, R. Dressler², Ch.E. Düllmann^{1,2}, B. Eichler²,
R. Eichler^{1,2}, H.W. Gäggeler^{1,2}, D. Piguet², A. Türler^{1,2}

¹ Department for Chemistry and Biochemistry, University of Bern, Switzerland

² Paul Scherrer Institute, Villigen, Switzerland





Predictions for element 112

Relativistic Calculations

112 behaves like a noble gas:

- Very volatile
- Only Van der Waal interactions with metallic surfaces

Literature: K.S. Pitzer, J. Chem. Phys. **63**, 1032 (1975)

Calculations based on the properties of the homologous elements

112 behaves like a noble metal:

- Very volatile
- Interacts like a metal

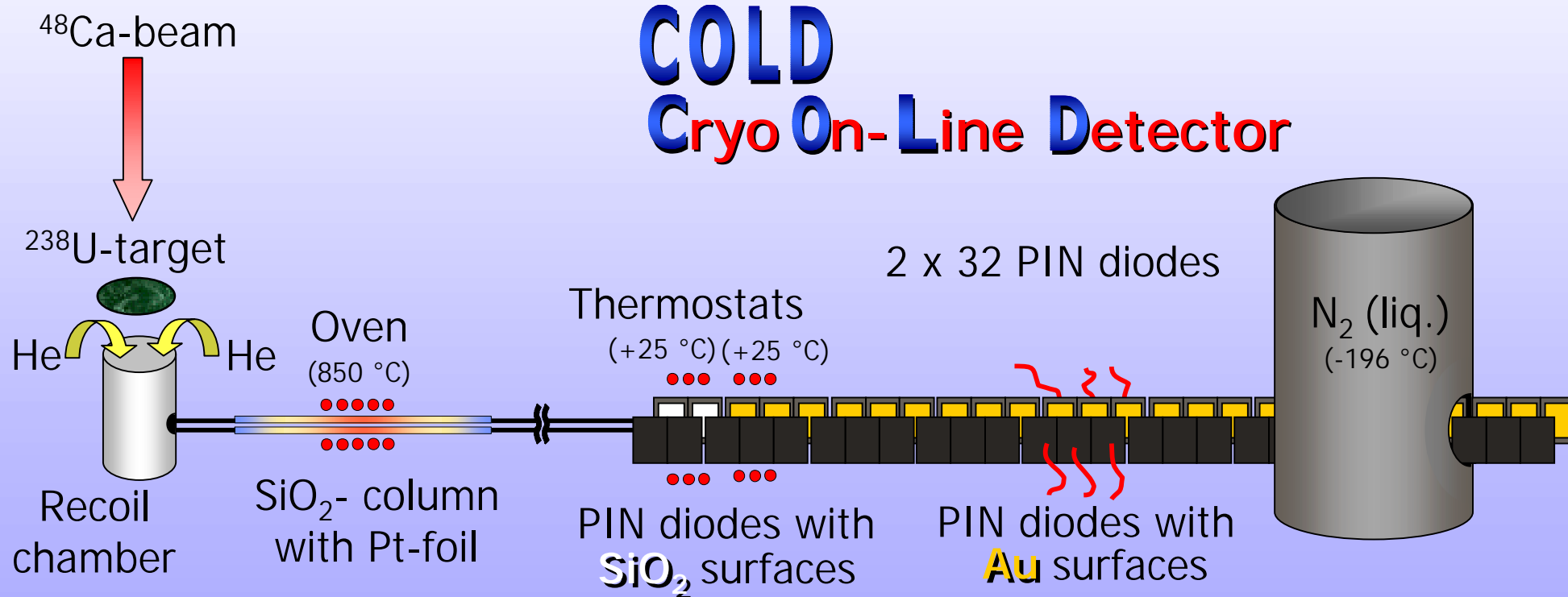
Literature: B. Eichler, Kernenergie 10, 307, 1976





I VO - Insitu Volatilization and On-line detection -system

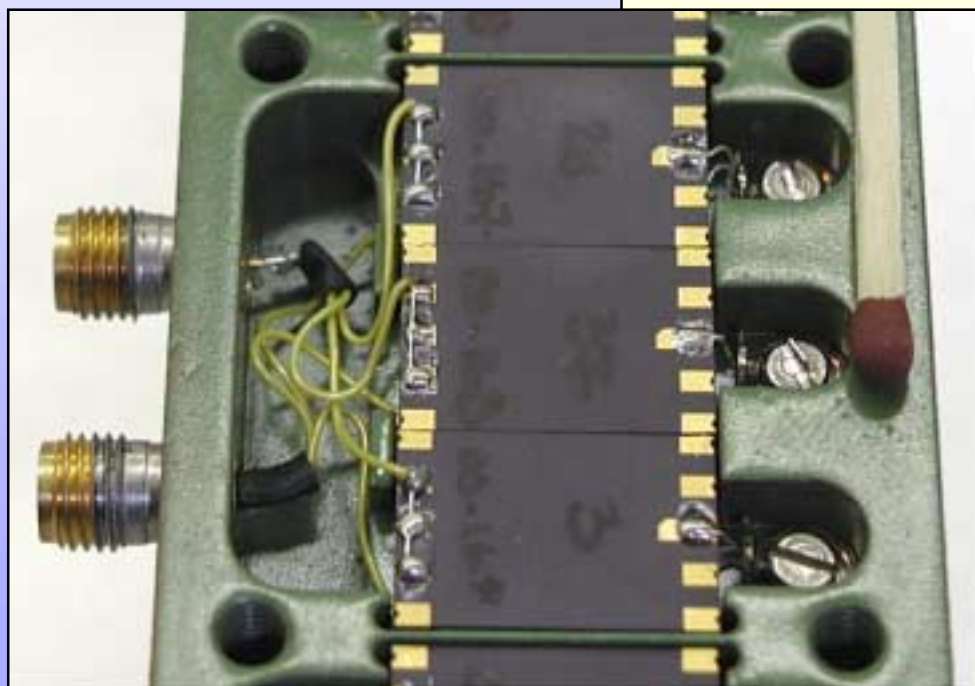
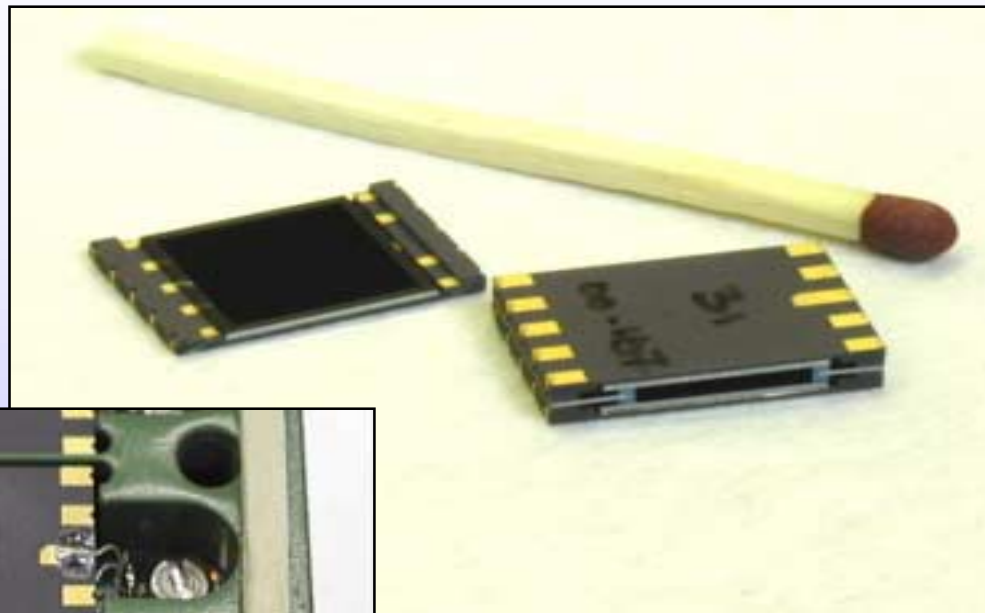
COLD Cryo On-Line Detector



COLD temperature gradient: +25 °C to -180 °C



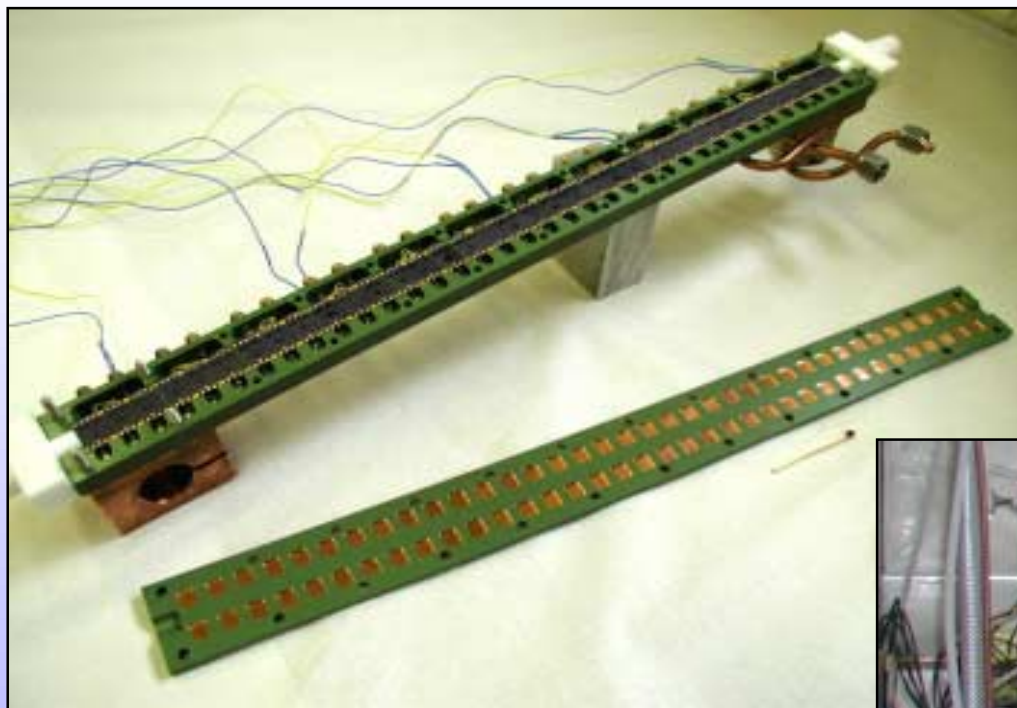
COLD - Cryo-On-Line-Detector



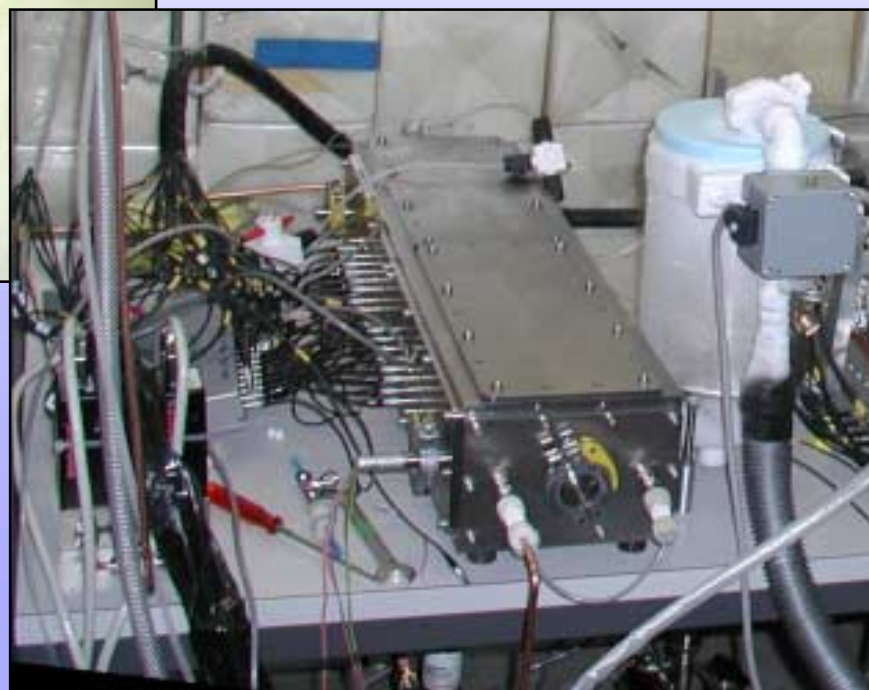


LABORATORY FOR RADIOCHEMISTRY AND
ENVIRONMENTAL CHEMISTRY OF THE UNIVERSITY OF
BERN AND THE PAUL SCHERRER INSITUTE

PSI



COLD - Cryo-On-Line-Detector

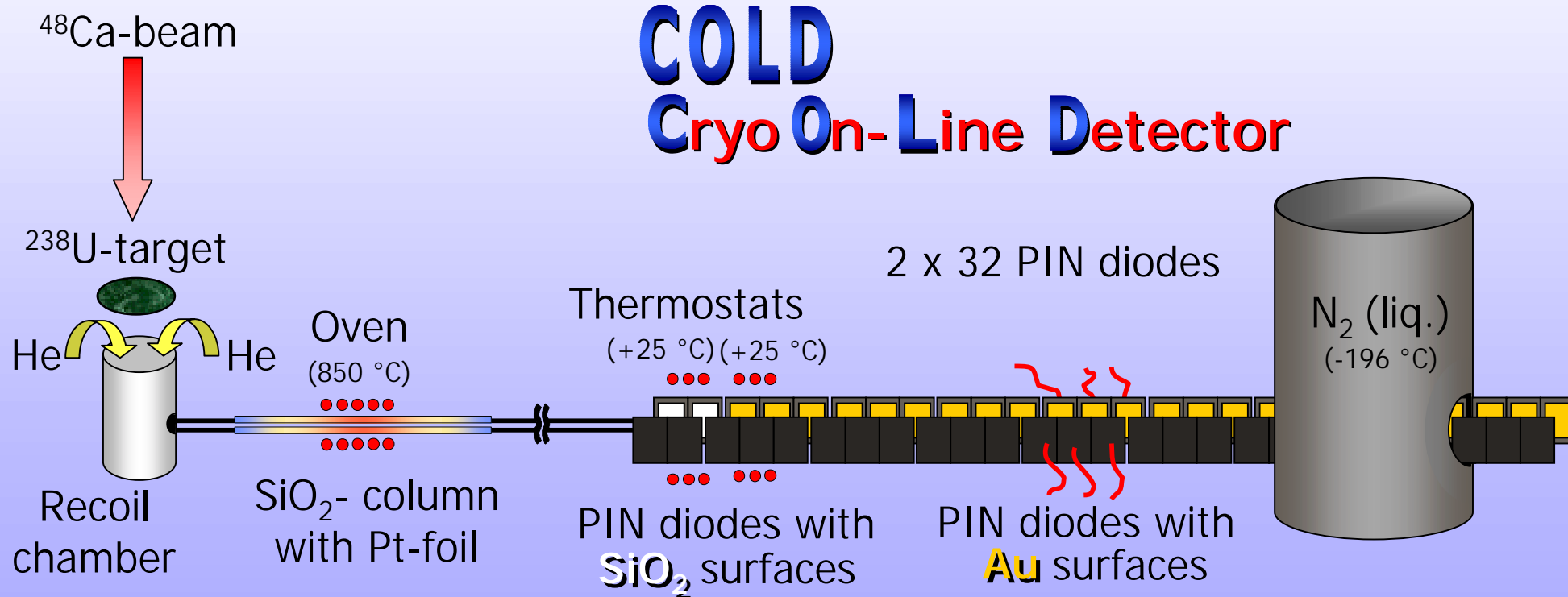


S. Soverna, March 2002



I VO - Insitu Volatilization and On-line detection -system

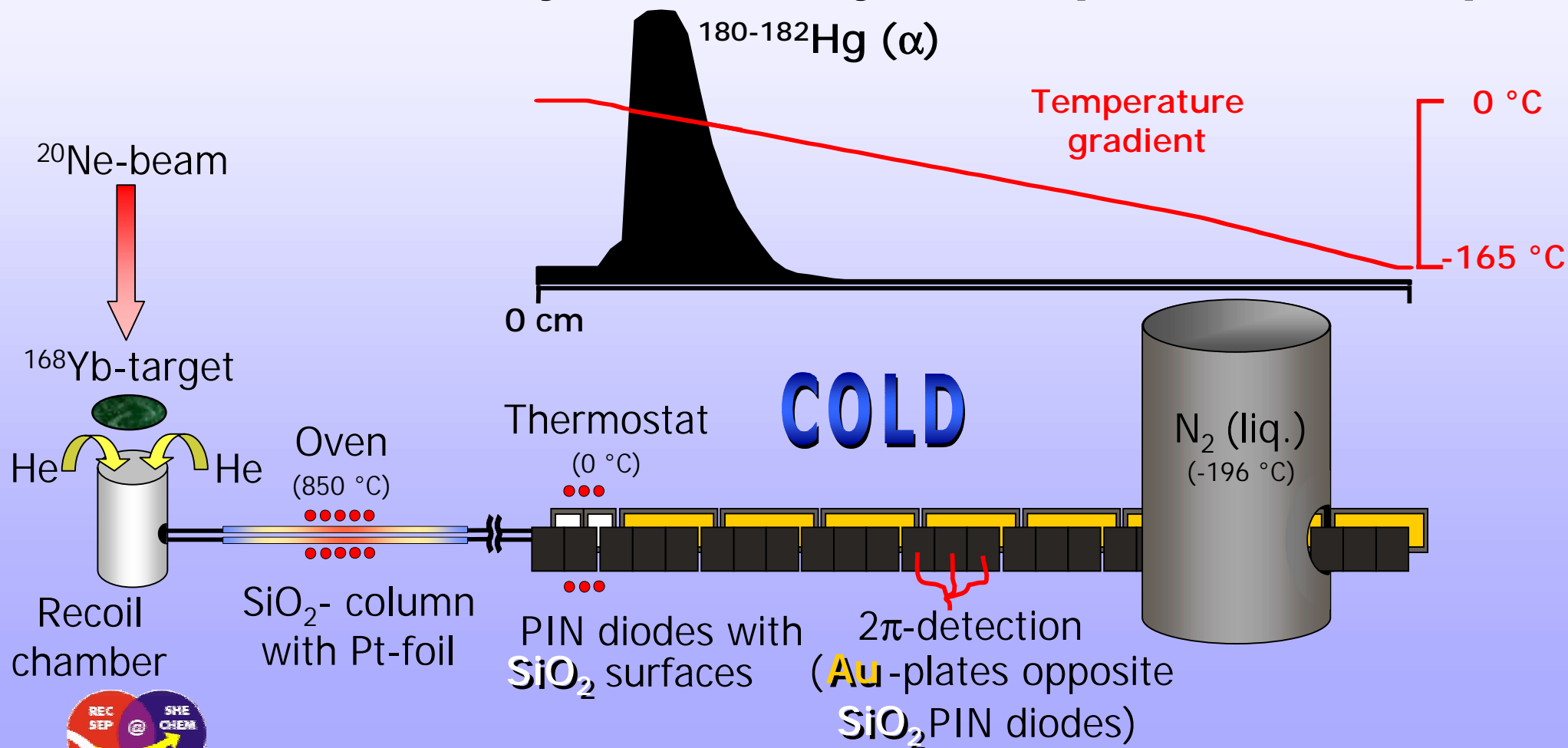
COLD Cryo On-Line Detector



COLD temperature gradient: +25 °C to -180 °C



Thermochromatogramm of Hg on Au (model studies)





Production of element 112

Nuclear reaction: $^{238}\text{U}(^{48}\text{Ca}, 3\text{n})^{283}112^*$

↙ sf ($T_{1/2} \approx 3$ min)

Expected event-rate of element 112

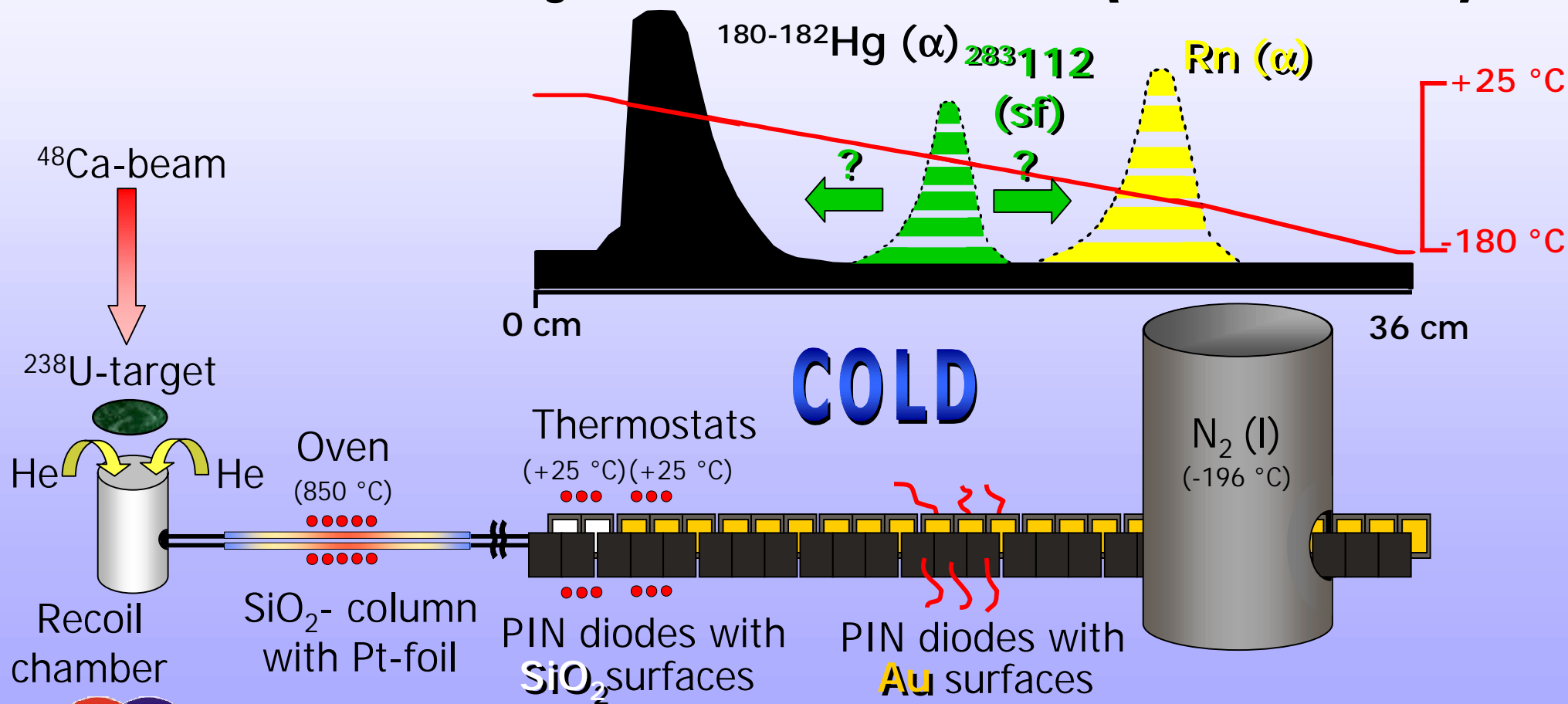
- ◆ Over all efficiency of IVO: 50 %
- ◆ Average beam intensity: 1 μA
- ◆ Target thickness: 1 mg/cm^2
- ◆ Expected production cross section 1 pb

➔ 4 detected $^{283}112$ fission events per week





Thermochromatogramm of Rn on Au (calculations)



COLD temperature gradient: +25 °C to -180 °C





LABORATORY FOR RADIOCHEMISTRY AND
ENVIRONMENTAL CHEMISTRY OF THE UNIVERSITY OF
BERN AND THE PAUL SCHERRER INSTITUTE

PSI

Thank you



PSI

H.U. Aebersold , R. Dressler,
Ch.E. Düllmann, B. Eichler,
R. Eichler, H.W. Gäggeler,
D. Piguet, L. Tobler, A. Türler



A.B. Yakushev



Z. Qin

**This project is supported
in part by the
Swiss National Science Foundation**

