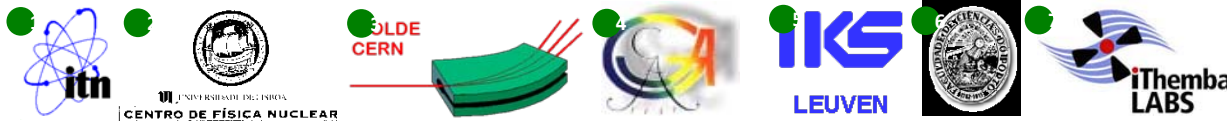


Future opportunities for emission channeling lattice location experiments using position-sensitive detectors and radioisotopes produced at HIE-ISOLDE

U. Wahl^{1,2}, J.G. Correia^{1,2,3}, H. Hofsäss⁴, U. Vetter⁴, A. Vantomme⁵,
S. Decoster⁵, J.P. Araújo⁶, L. Pereira^{1,5,6}, E. Alves^{1,2}, K. Lorenz^{1,2}, V. Darakchieva^{1,2}, C.P. Marques¹, N.
Catarino¹, L. Amorim², M.R. da Silva², K. Bharuth-Ram⁷



-WHY EMISSION CHANNELING?

Dopant / impurity properties depend on lattice sites

Impurity sites depend on many parameters:

Chemical nature

Point defects

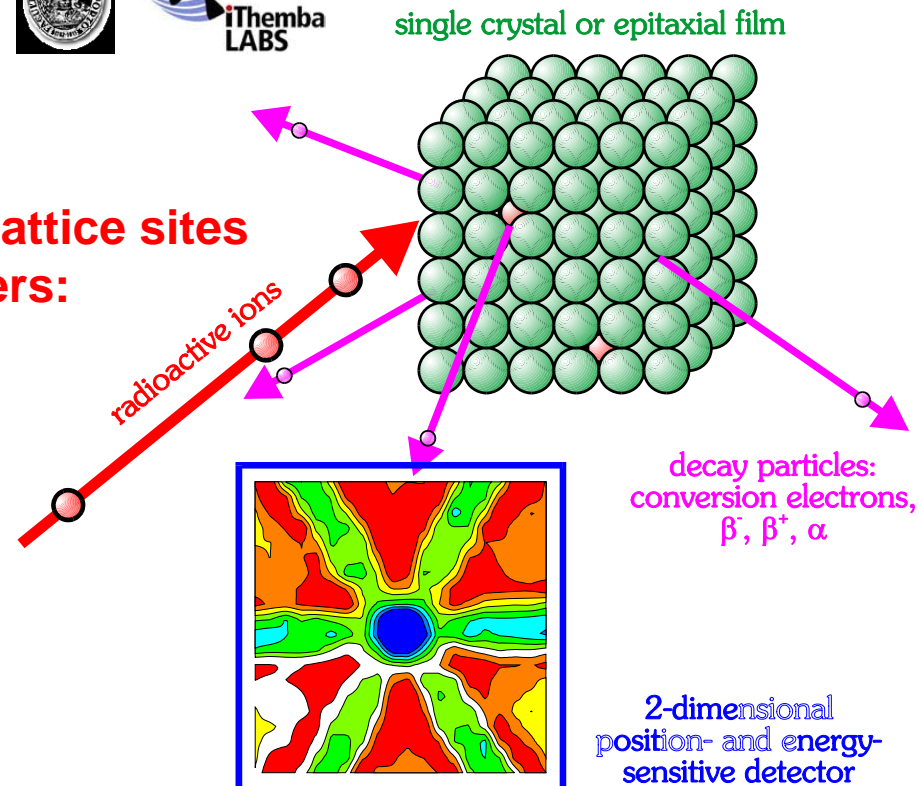
Ionic radius

Temperature

Emission channeling precision ~ 0.1 Å

IS453 EC-SLI experiment

Emission Channeling with Short-Lived Isotopes



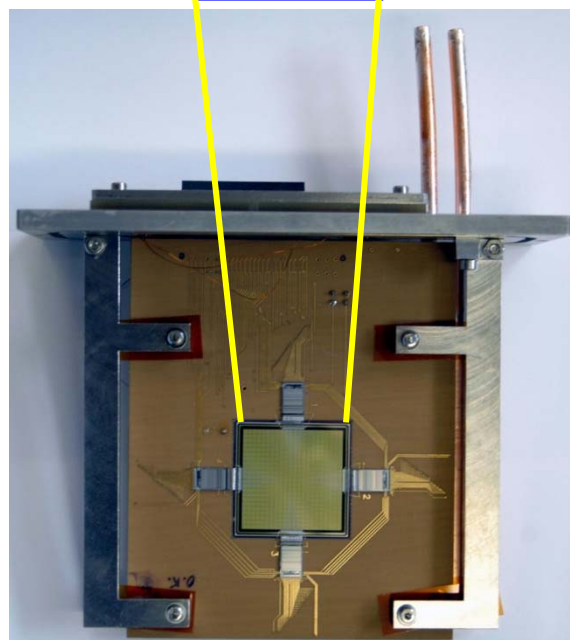
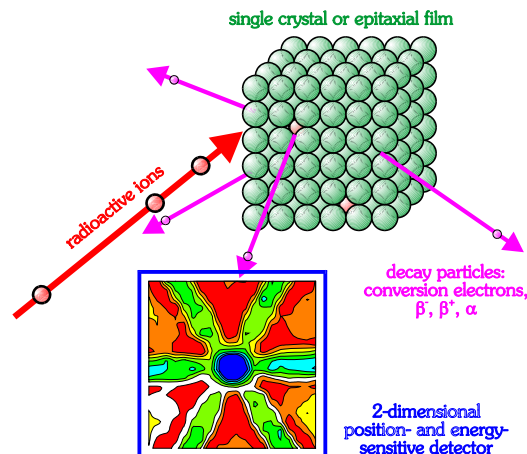
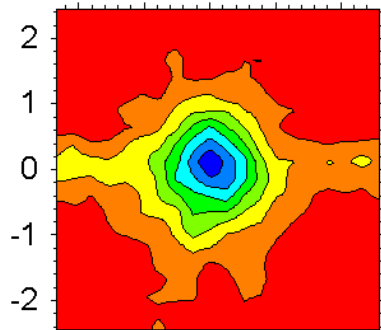
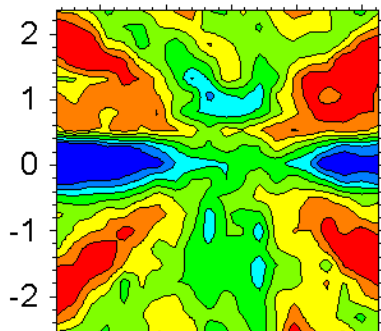
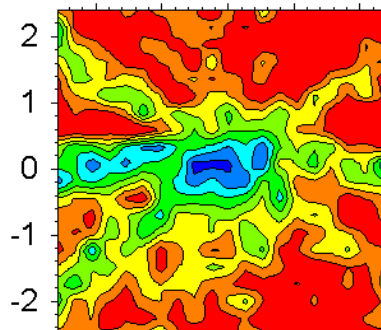
EMISSION CHANNELING

MAJOR FIELD OF APPLICATIONS:

Lattice location of dopants and impurities in semiconductors and oxides

^{59}Fe (β^-) in Si

$\langle 110 \rangle$ axis view



Si 22 x 22 pad CERN detector

EC-SLI uses various types of position-sensitive detectors:

- Si pad detectors (developed at CERN for Compton camera project) for β^- and conversion electrons
- CCD for low-energy (< 40 keV) conversion electrons
- Resistive charge division for α particles
- FUTURE:
CERN MediPix and TimePix
512 x 512 pixel detectors

New perspectives at HIE-ISOLDE

- EC-SLI has been used for a variety of radioisotopes, but not all elements are available at ISOLDE
- Availability of a number of (new) radioactive probe isotopes is expected for HIE-ISOLDE
- Beam development for some others is encouraged!

H																	He
Li	Be	β^-		β^+	CE	α -emitters		B	C	N	O	F	Ne				
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Cu	Ni	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sb	Te	I	Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

