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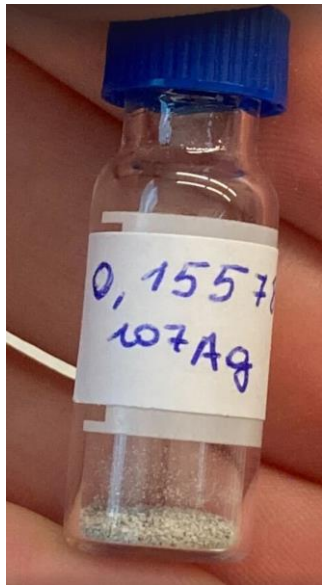
Update muX meeting 22/02

Marie Deseyn

BR2 proposal



Proposal for neutron irradiation at BR2

^{107}Ag neutron irradiation to produce ^{108m}Ag for charge radius determination

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Abstract

Nuclear charge radii, because of their dependence on the distribution of charge within the nucleus, are well-suited probes for testing nuclear models. In this context, charge radii of silver isotopes have been extensively measured using laser spectroscopy techniques. However, in laser spectroscopy experiments, the determination of charge radii requires the mass and field shift paramters, which are not yet known experimentally. To determine the mass and field shift parameters experimentally, the absolute charge radius of at least three silver isotopes is needed. Silver has two stable isotopes (^{107}Ag, ^{109}Ag) and the longest-lived radio-active isotope is ^{108m}Ag. These are proposed to be studied with muonic x-ray spectroscopy, from which the absolute charge radii will be extracted. To produce ^{108m}Ag, neutron irradiation of enriched ^{107}Ag is needed. Therefore, we propose to irradiate enriched ^{107}Ag at the BR2 reactor with a neutron fluence of $10^{15}\,\frac{\text{Neutrons}}{\text{cm}^2}$ for three cycles of 30 days of irradiation and 30 days of cool-down each.

Geant 4 simulations

Overview detectors muX

Name	Extra information	Owner	Contact person
BEGE3820	20% BEGe	MIXE PSI	michael.heiss@psi.ch
REGE9524	90% REGe coaxial	TUM	elizabeth.mondragon@tum.de
BEGE3830	34% BEGe	TUM	elizabeth.mondragon@tum.de
Leuven 70%	70% HPGe	KU Leuven	
Coax 5019	50% SEGe coaxial	JINR	d.zinatulina@gmail.com
Tigress clover	4x ~38% = 152% (~221% with addback) TIGRESS clover	IFIN-HH Romania	razvan.lica@nipne.ro
Miniball		KU Leuven	
IFIN det2 100%	100% coaxial	IFIN-HH Romania	razvan.lica@nipne.ro
BEGE3820	20% BEGe	MIXE PSI	michael.heiss@psi.ch
IFIN det1 100%	100% coaxial	IFIN-HH Romania	razvan.lica@nipne.ro
REGE7023	70% REGe coaxial	muX PSI	a.knecht@psi.ch
Leuven 75%	70% HPGe	KU Leuven	
REGE7023	70% REGe coaxial	MIXE PSI	michael.heiss@psi.ch
Electro cooled	GC5019 ("Rasputin")	JINR	d.zinatulina@gmail.com

Development of wide range photon detection system for muonic X-ray spectroscopy

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Table 1
The characteristics of Ge detectors. All the detectors are manufactured by Canberra Inc.

Ge model	GC3018	GX5019	BE2820
Crystal	coaxial	coaxial	planer
Type	P-type	P-type	N-type
PreAmp	2002CSI	iPA-SL10	iPA-SL10
Rel. efficiency	30%	50%	13%
Window	1.6 mm (Al)	0.6 mm (C)	0.6 mm (C)
Serial number	9681, 9682	5536	13385, 13386

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