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GANDALPH @ CRIS

S. Rothe on behalf of

CRIS collaboration

ISCC 2018

The ionization potential of astatine

nature COMMUNICATIONS

ARTICLE

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Measurement of the first ionization potential of astatine by laser ionization spectroscopy

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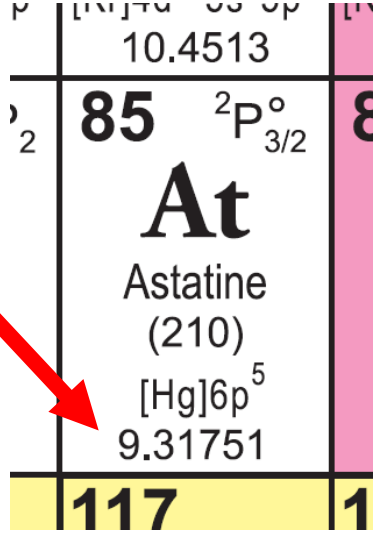
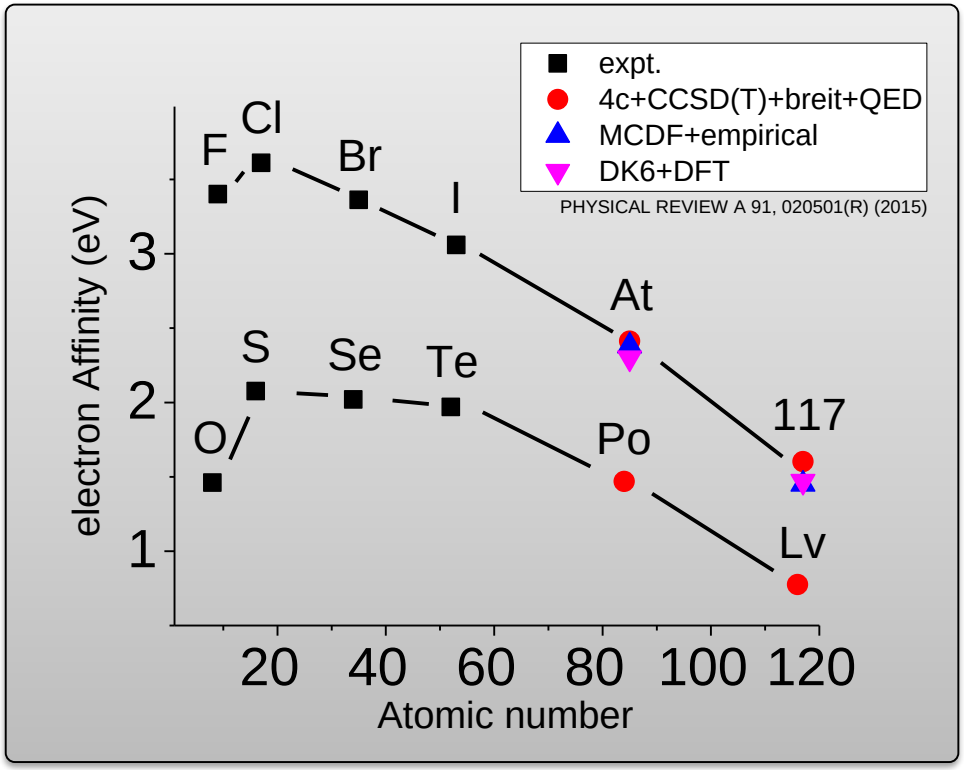


IP (At) = 9.31751(8) eV

The electron affinity of astatine



- No experimental value for EA(At) yet
- Scattering of all theoretical predictions and extrapolations ~1 eV

Letter of Intent INTC-I-148

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Letter of Intent to the ISOLDE and Neutron Time-of-Flight Committee

Preparation of negative ion beams for the determination of the electron affinity of polonium and astatine by laser photodetachment

25.09.2013

S. Rothe[1], M. Bissell[2], T. Day Goodacre[1,3], V. Fedosseev[1], K. Flanagan[3], N. Galland[4], T. Giles[1], A. Gottberg[1], D. Hanstorp[5], U. Köster[6], T. Kron[7], Yu. Kudryavtsev[2], B. Marsh[1], G. Montavon[8], G. Neyens[2], S. Raeder[2], E. Renault[4], R. Rossel[1,9], M. Stachura[1], T. Stora[1], K. Wendt[7]

2013

Proposal INTC-P-462

Proposal to the ISOLDE and Neutron Time-of-Flight Committee

(Following ISOLDE Letter of Intent I-148)

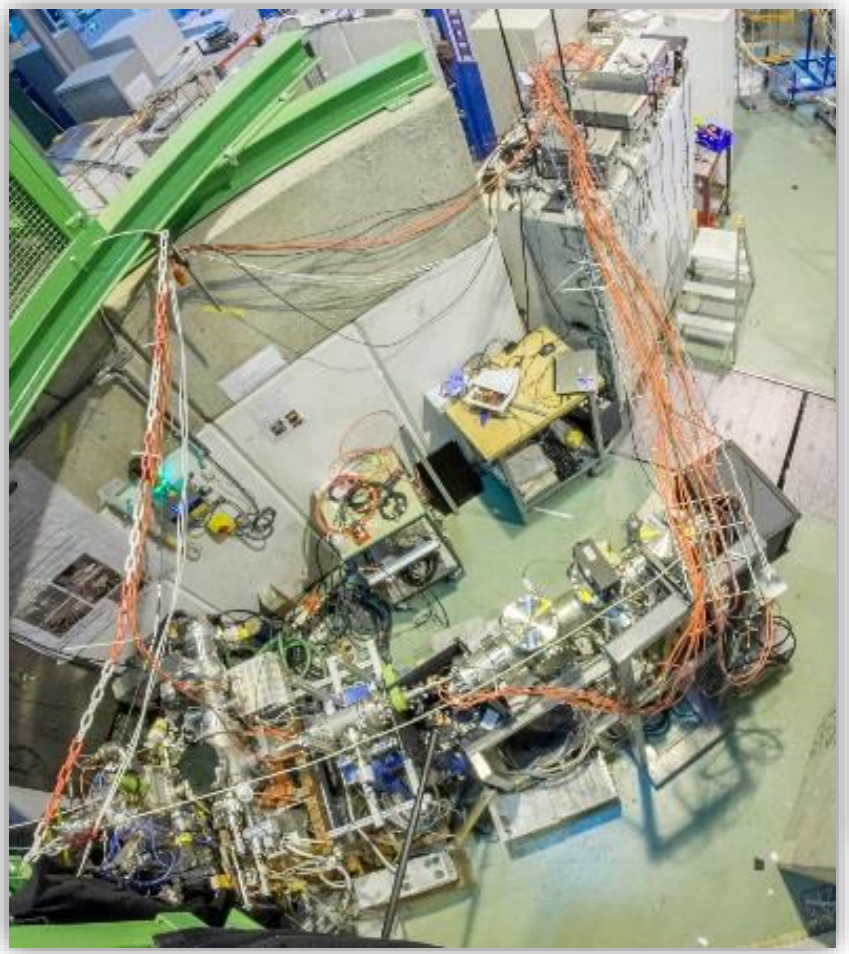
Determination of the electron affinity of astatine and polonium by laser photodetachment

January 12, 2016

S. Rothe[1,2,3], J. Champion[4], K. Chrysalidis[1,5], T. Day Goodacre[1,3], V. Fedosseev[1], N. Galland[6], D. Hanstorp[2], R. Heinke[5], U. Köster[7], T. Kron[5], Y .Liu[8], B. Marsh[1], G. Montavon[4], E. Renault[6], A. Ringwall-Moberg[2], R. Rossel[5], C. Seiffert[1], J. Sundberg[1,2], J. Welander[2], and K. Wendt[5]

2016

GANDALPH @ GLM

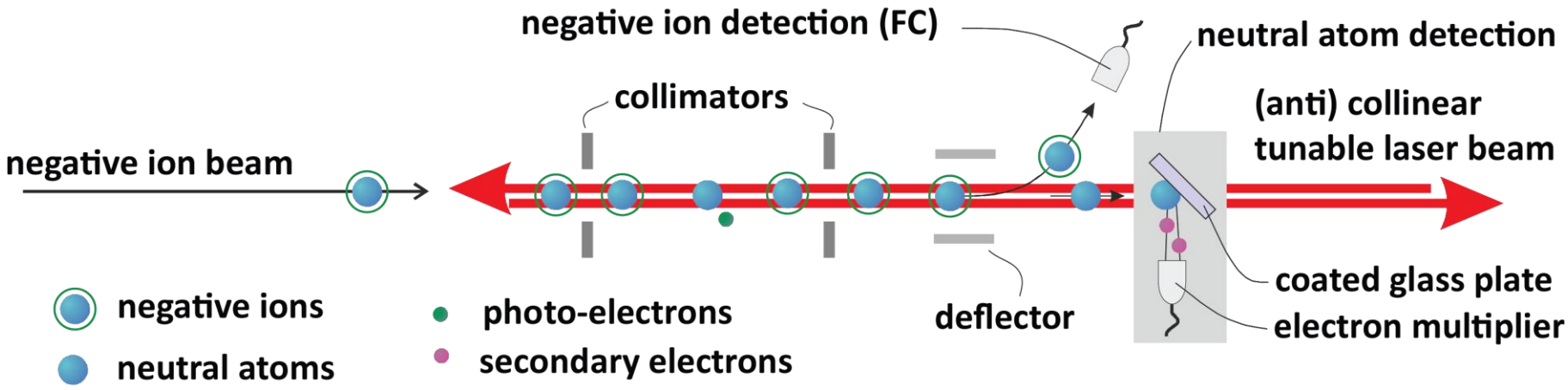


Successful stable iodine detachment 2015

Laser photodetachment of radioactive 128I- 2016

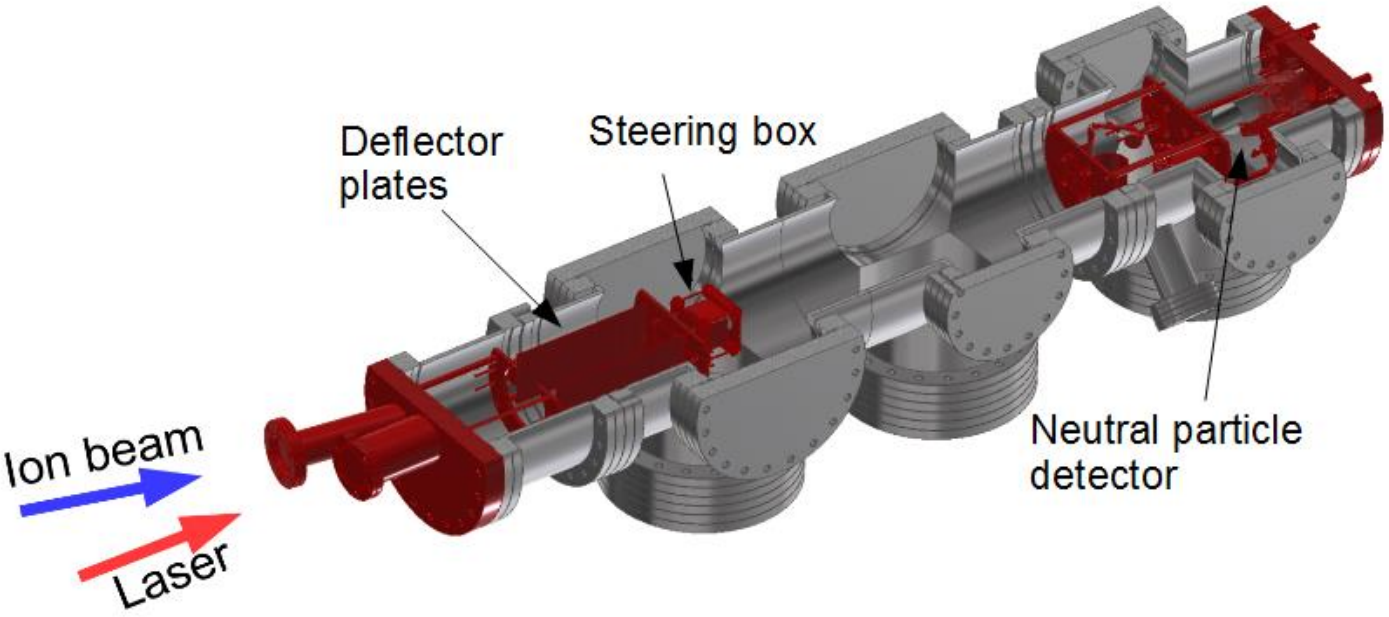
OPEN ACCESS
IOP Publishing
Journal of Physics G: Nuclear and Particle Physics
J. Phys. G: Nucl. Part. Phys. **44** (2017) 104003 (10pp)
https://doi.org/10.1088/1361-6471/aa80aa

The Method: Collinear laser photodetachment



GANDALPH

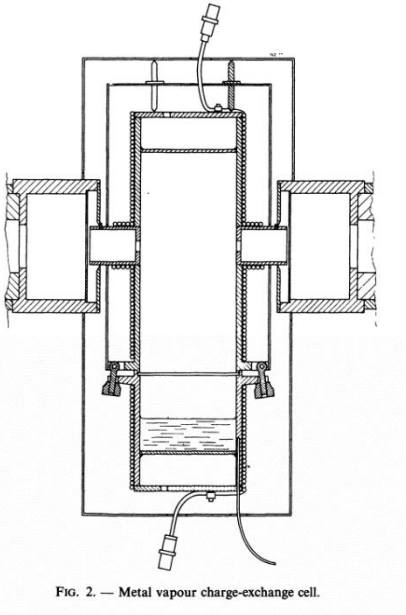
Gothenburg **AN**ion
Detector for **A**ffinity
measurements by **L**aser
PHotodetachment



Julia Sundberg
David Leimbach

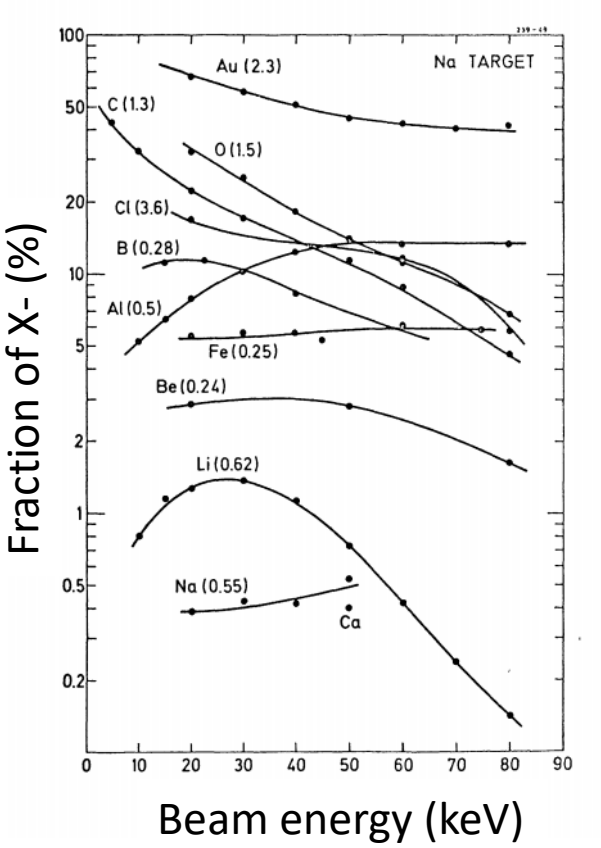
Future of GANDALPH

- GANDALPH@GLM requires negative ions from ISOLDE target.
- Limits available beams mostly to halogens and chalcogens.
- Polonium unlikely to obtain from MK4
- Double charge exchange

X^+ → 

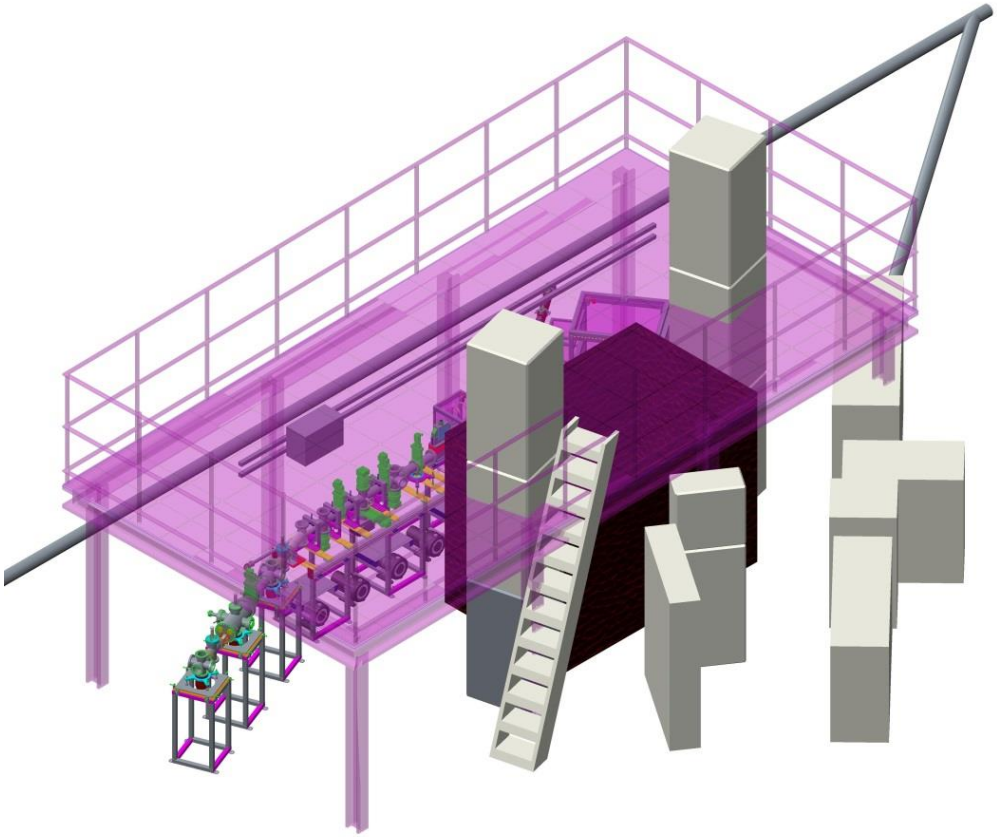
→ X^+, X, X^-

(CRIS) Charge exchange cell



J. Heinemeier, P. Tykesson. Production of negative heavy ion beams by charge exchange in metal vapour. Revue de Physique Appliquee, 1977, 12 (10), pp.1471-1475.

Proposal: Platform above CRIS



Disclaimer: Very preliminary drawing to highlight concept.

Motivation

- Create required space to integrate Gandalph and CRIS.
- Allow HV services and power to better organized and more accessible (improved safety)
- Address laser stability and safety considerations.
- Address current safety issues associated with ladder access to gangway above COLLAPS and CRIS.
- Increase experimental space in hall

Approach

- Design will require consultation with fixed experiments in the hall so that this doesn’t negatively effect their operation.
- Consideration for crane access, vibrational stability and impact.
- Design effort followed by cost estimation and funding requests.
- Installation during the second half of LS2