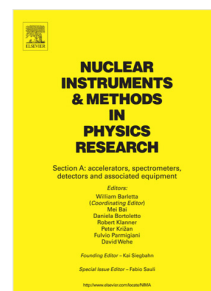


Accepted Manuscript

Measurement of the atomic ion fraction of ion emitted from a miniature penning ion source

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PII: S0168-9002(18)30907-0
DOI: <https://doi.org/10.1016/j.nima.2018.07.071>
Reference: NIMA 61017

To appear in: *Nuclear Inst. and Methods in Physics Research, A*

Received date: 31 May 2018
Revised date: 10 July 2018
Accepted date: 23 July 2018

Please cite this article as: F. Yan, D. Jin, L. Chen, K. Xiao, Measurement of the atomic ion fraction of ion emitted from a miniature penning ion source, *Nuclear Inst. and Methods in Physics Research, A* (2018), <https://doi.org/10.1016/j.nima.2018.07.071>

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1 **Measurement of the atomic ion fraction of ion emitted from a miniature penning**
2 **ion source**

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6

7 **Abstract:**

8 Penning-type ion source performance for neutron generator applications is
9 characterized partly by the atomic ion fraction, providing one path by which source
10 performance can be improved for increased neutron yields. A miniature penning ion
11 source has been fabricated to investigate the atomic ion fraction of deuterium plasma by
12 a mass-energy analyzer. The discharge current and atomic ion fraction increase with the
13 increase of anode voltage and pressure. Effects of electrode materials on discharge
14 characteristics have been studied. The atomic ion fraction could increase about 2% of
15 [the original atomic fraction](#) by Au cathode instead of steel cathode, and it could increase
16 about 1% [of the original atomic fraction](#) by Al cathode. The results can provide useful
17 information for improving source performance by selecting more suitable anode voltage,
18 pressure and electrode material.

19

20 **1. Introduction**

21 Penning-type ion sources have continued to experience extensive use and
22 development since first discharge experiments were performed by Penning in 1936 [1].

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