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# **8th EPS Conference on Atomic and Molecular Physics**

Rennes, France, 6-10 July 2004

Editors: K.M. Dunseath and M. Terao-Dunseath

## **Contributed Papers, Part II**

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Published by: European Physical Society

Series Editor: Prof. R.M. Pick, Paris

Managing Editor: P. Helfenstein, Mulhouse

Volume 28F  
Part II

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**ISBN: 2-914771-21-5**

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The ECAMP VIII organising committee gratefully acknowledges the support given by:

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ECAMP VIII includes the 36th EGAS Conference as well as PAMO 2004, the bi-annual conference of the Atomic and Molecular Physics and Optics Division of the French Physical Society. PAMO 2004 takes the form of three special sessions on Wednesday 7th July.

The scientific programme also includes three one-day Symposia on Atoms, Molecules, Optics in Astrophysics (Tuesday 6th July), Radiation Damage in Bio-molecules (Friday 9th July) and Atoms, Molecules, Optics and the Environment (Saturday 10th July).

# THE ELECTRON IMAGING SYSTEM WITH VARIABLE MAGNIFICATION FOR A 2D DETECTOR WITH HIGH SPATIAL RESOLUTION FOR METASTABLE GAS ATOMS

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We present a study of an alternative imaging system to that described by Kurtsiefer and Mlynek [1] for a detector for metastable rare gas atoms where the conversion step from the metastable atom to an electron was separated from the charge amplification to improve spatial resolution. Our approach allows practically continual tuning of magnification in the range of 14 to over 55. It is obtained even with smaller longitudinal size of the detector (about 500 mm). The magnification is regulated by appropriate choice of lens potentials only, using two electron imaging stages (see figure 1a). In the first one, the electrons are extracted from the conversion plane and imaged to an intermediate real image with a four-electrode unipotential zoom lens. A number of such lenses have been tested to obtain as large as possible range of magnification. At the second stage, the real intermediate image is projected onto the detection plane with the use of three-electrode einzel lens. The object distance  $P$  and image distance  $Q$  of this lens are fixed ( $P = 2D$  or  $4D$  – for higher or lower magnification;  $Q = 40D$ ;  $D$  being the diameter of the lens), while the overall magnification is changed by tuning the voltages of the 4E zoom lens. The investigation of the electron-optical system was performed with the use of SIMION 6D [2]. The obtained zoom curves, magnification and aberrations of the system, as a function of the third electrode voltage  $U_3$  of zoom lens, are presented in figure 1b.

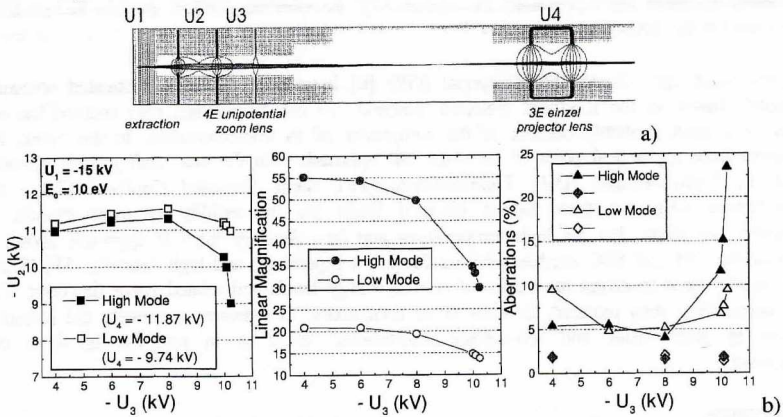


Figure 1. a) Setup of the electron-optical system. b) The second electrode voltage  $U_2$  (squares), linear magnification (circles), spherical aberration for  $\pm 10^\circ$  (up-triangles) and aberration due to the uncertainty of  $\pm 10$  V of  $U_2$  (diamonds), as a function of third lens voltage  $U_3$ . The aberrations are presented by relative uncertainty of the Y-position of imaged off-axis point on the detection plane.

## References

- [1] Ch. Kurtsiefer, J. Mlynek, Appl. Phys. B 64, 85 (1997)
- [2] D. A. Dahl, SIMION 3D VERSION 6.0, User's Manual (1995)

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