

XII *Yugoslav Summer School
and International*

**Symposium on
Physics of
Ionized
Gases**

'84 Šibenik, Yugoslavia, September 3-7, 1984

CONTRIBUTED PAPERS

and

Abstracts of invited lectures and progress reports

INTEGRAL CROSS SECTIONS FOR ELASTIC AND INELASTIC
SCATTERING OF ELECTRONS BY ARGON AND XENON ATOMS*

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Integral cross sections for elastic and inelastic scattering of electrons by argon and xenon atoms has been calculated for all measured curves reported in references (1) and (2). Inelastic scattering has been measured up to 5° or 10° . Since that small angle scattering influence a lot to integral cross section, extrapolation of elastic cross section curves have been done with a special care.

In Figure 1. are shown elastic integral cross sections for xenon atom. We estimate that total error is not larger than 25%. In the same figure are presented integral elastic cross sections of the other autors^(3,4) as well as total cross sections of Jost⁽⁵⁾ et al. Total cross sections are performed with high accuracy (total error 5%) and serve as a guide for calculated integral cross sections. In the energy region where the ionization processes are significant, difference between total and integral elastic cross sections are much larger.

The example of inelastic integral cross sections is shown in Figure 2. Data for the first four inelastic transitions in argon ($4s[3/2]_2^0$, $4s[3/2]_1^0$, $4s'[1/2]_0^0$, $4s'[1/2]_1^0$) are presented together with results of optical measurements of McConkey and Donaldson⁽⁶⁾ which are corrected for cascade and Mentall and Morgan⁽⁷⁾ including cascade. Agreement with these two optical measurements and FOMB theory of Padial et al.⁽⁸⁾ is better than with experiment of Chutjian and Cartwright⁽⁹⁾.

Up to date there is only measurement of Williams et al.⁽³⁾ of differential and integral cross sections for inelastic scattering of 20 eV impact energy electrons by xenon.

* Supported by RZN SRS Yugoslavia and partly by
NBS (G) 260, USA

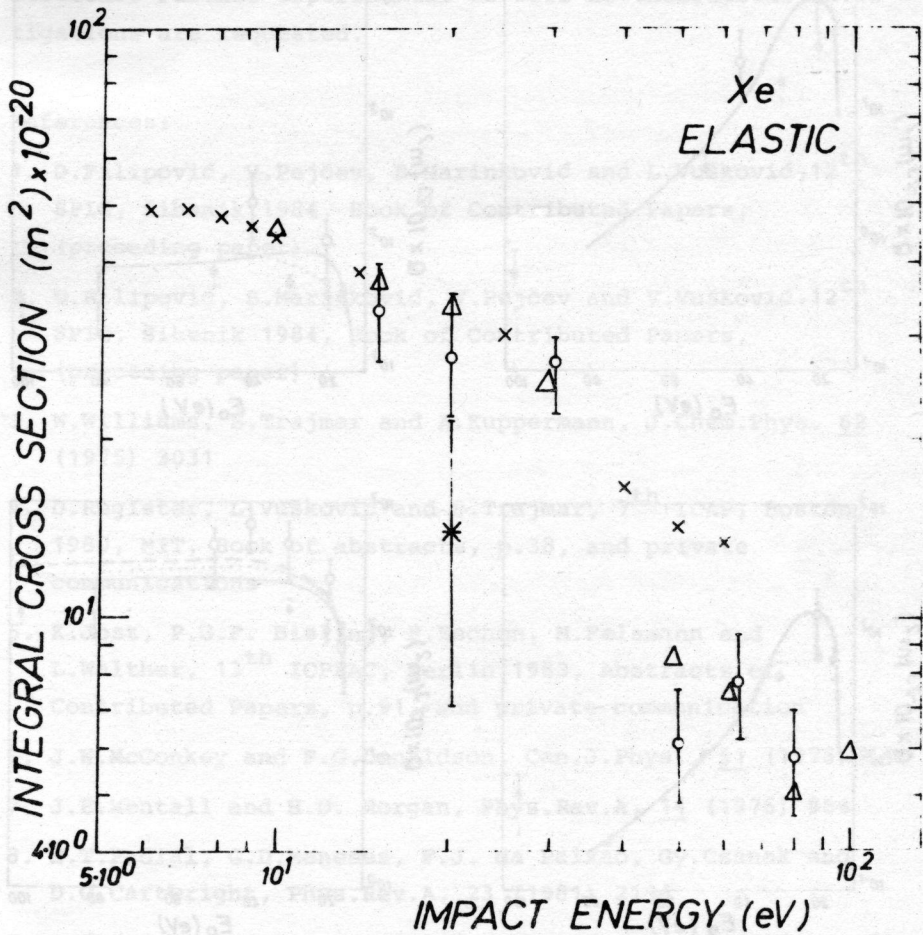


Fig.1. Elastic integral cross sections for xenon atom. Circles (o) are present data, triangles (Δ) Register et al. (Ref.4), asterisks (*) Williams et al. (Ref.3), crosses (x) total cross sections of Jost et al. (Ref.5).

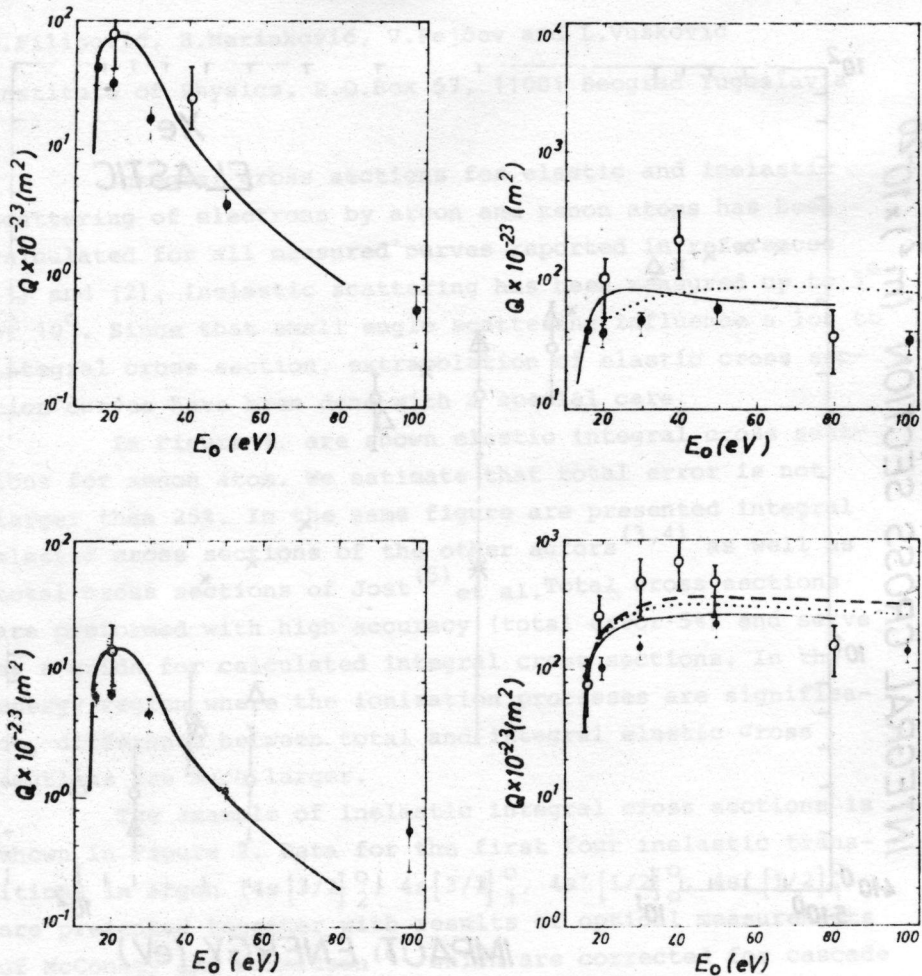


Fig.2. Integral cross sections for the first four inelastic transitions in argon. Circles (o) are present data, filled circles (o) experimental results (Ref.9), solid line (—) FOMB theory (Ref.8), dash line (— —) optical experiment including cascade (Ref.7), dot line (··) optical experiment corrected for cascade

* supported by JSC SPS Research and partly by
NSF 480 240, USA

Significant disagreement exist between our results and those of Williams et al. in both elastic and inelastic cross sections. Further experimental as well as theoretical investigations are requested.

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