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RESONANT STRUCTURES IN THE ELASTIC CHANNEL OF e^- - Cd SCATTERING

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As a continuation of our work on measuring differential cross sections (DCS) for the elastic and inelastic scattering of electrons on the atoms of the IIb group, we present here the preliminary results in determination of the parameters of the resonances in e^- - Cd elastic DCS at three different angles $\Theta = 20^\circ$, 120° and 146° . Impact electron energy ranged from 2 to 10 eV.

The experiment is of the crossed - beam type. DCS were obtained using the electron spectrometer described in detail elsewhere [1].

Cd atom doesn't have stable negative ions [2], but it shows interesting structures in elastic DCS, due to temporary negative ions. Within the observed energy range, Cd has several resonances recognized by different authors: d- resonances just below the threshold for the excitation of the 5^3P states [3] ($E = 3.0$ - 3.5 eV) and two at 6.75eV and 7.24 eV [4].

Since there is only scarce data for resonance processes in Cd and, also, very few theoretical calculations [5], our intention was to make a method for the determination of the positions and widths of these resonances.

Our fitting method, applied to those structures which we consider resonances, takes into account both resonant and nonresonant contributions in the scattering amplitude. It has been already used in the analysis of the He

resonances [6]. In our case, the shape of the elastic DCS implied that the background could have been of the quadratic shape. Therefore, the minimal set of fitting parameters was made of the slowly varying quadratic background and, for each resonance, energy position, width, its relative intensity and nonresonant phase shift.

On Fig. 1 are shown elastic DCS in the observed energy range. As an example, Fig. 2 presents typical results of the first resonance fit at three different angles. We, also, made the correction of our elastic DCS to the transmission function. The resolution of the electron spectrometer was about 50 meV.

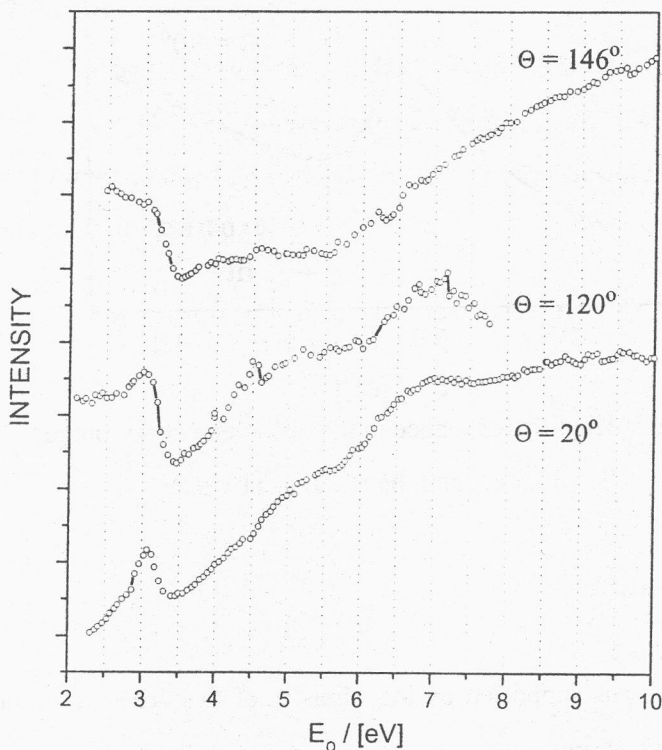


Figure 1: Elastic DCS for e^- - Cd scattering

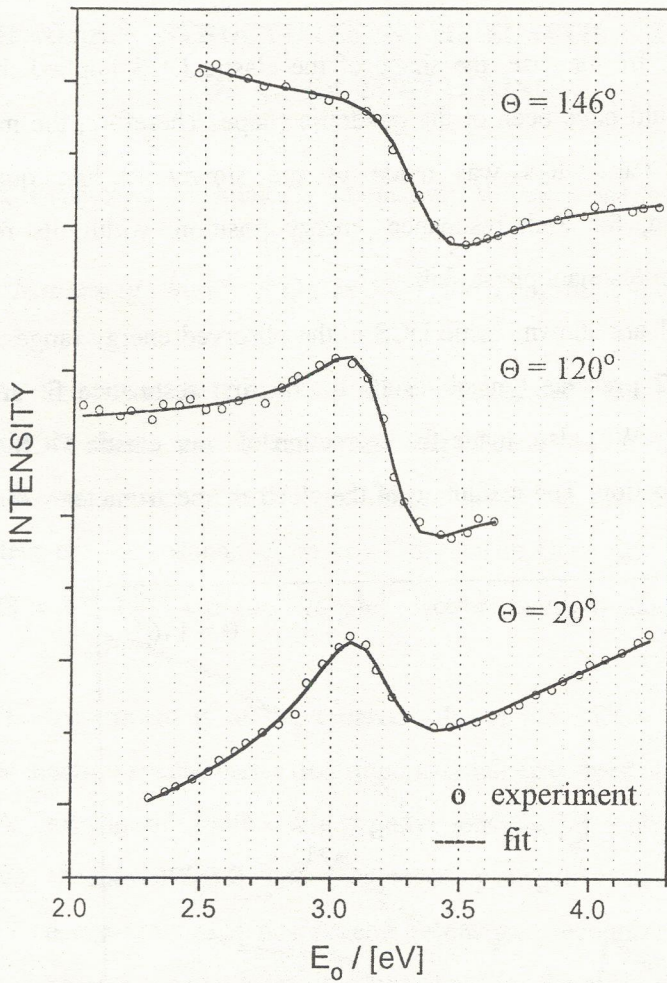


Figure 2: The first resonance in the observed energy range;
 $E = 3.23 \text{ eV}$ and the width is 310 meV

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