

# **Comparison of the SLAC Experimental data on the Radiation of Planarly Channeled Positrons with Theory Taking into Account the Medium Polarization**

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# 1. Introduction

The experimental results on radiation of (4-16) GeV positrons channeled between the diamond crystallographic planes have been compared with theories without taking into account the medium polarization in many works (see for instance [1]). Recently it has been developed a corresponding theory [2] taking into account the density effect, and it has been carried out comparison with the experimental data only at 4 GeV, zero entrance angle and radiator thickness 80  $\mu\text{m}$ .

In this work using the theory it is presented the results of more complete comparison for various positron energies namely  $E=4,6,10$  GeV obtaining better agreement as in the region of relatively low energy photons as well as in the region of high energy photons. Besides it has been carried out comparison between experimental and theoretical data for 6 GeV and diamond thickness of 600  $\mu\text{m}$ . The experimental results for 600  $\mu\text{m}$  radiator have not been published in our earlier works [3].

1. V. Bazilyev and N. Zhevago "Izluchenie bistrikh chastiz v veshchestve I vo vmeshnikh polyakh", Moscow 1987.
2. L. Gevorgian and L. Hovspyan Proc. Of SPIE 6634, 663408, 2007
3. R. Avakyan et al., JETP 55(6),1982

## 2. Experiment setup diagram

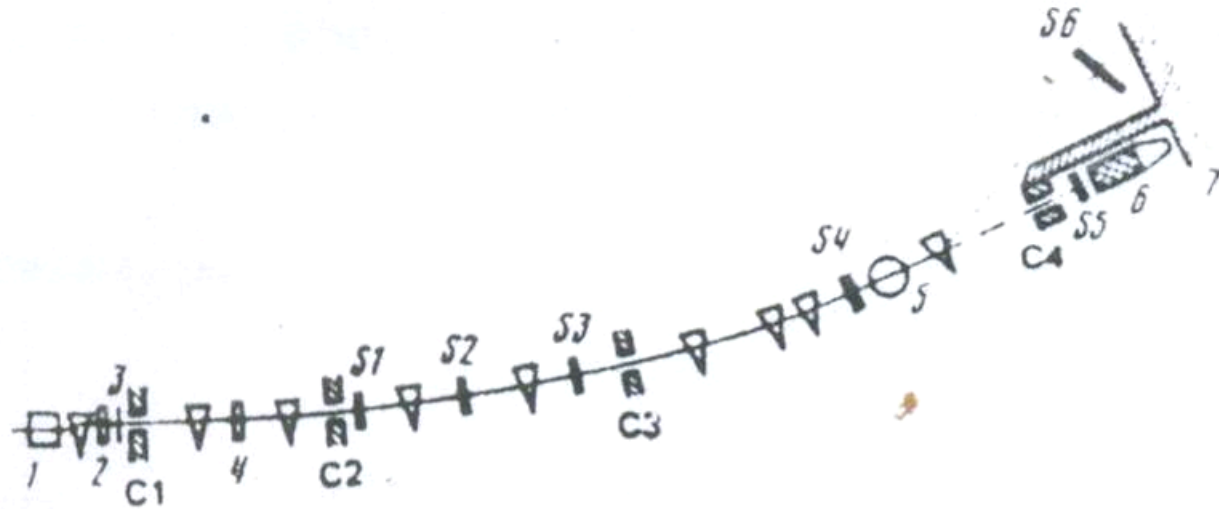


FIG. 1. Diagram of experiment. 1—Pulsed magnet, 2—tungsten target, 3 and 4—secondary emission monitors, 5—goniometer, 6—Na I (Tl) spectrometer, 7—lead shield, C1—C4—collimators, triangles—bending magnets, S1—S6—scintillation counters.

### 3. Experiment results and their comparison with theory

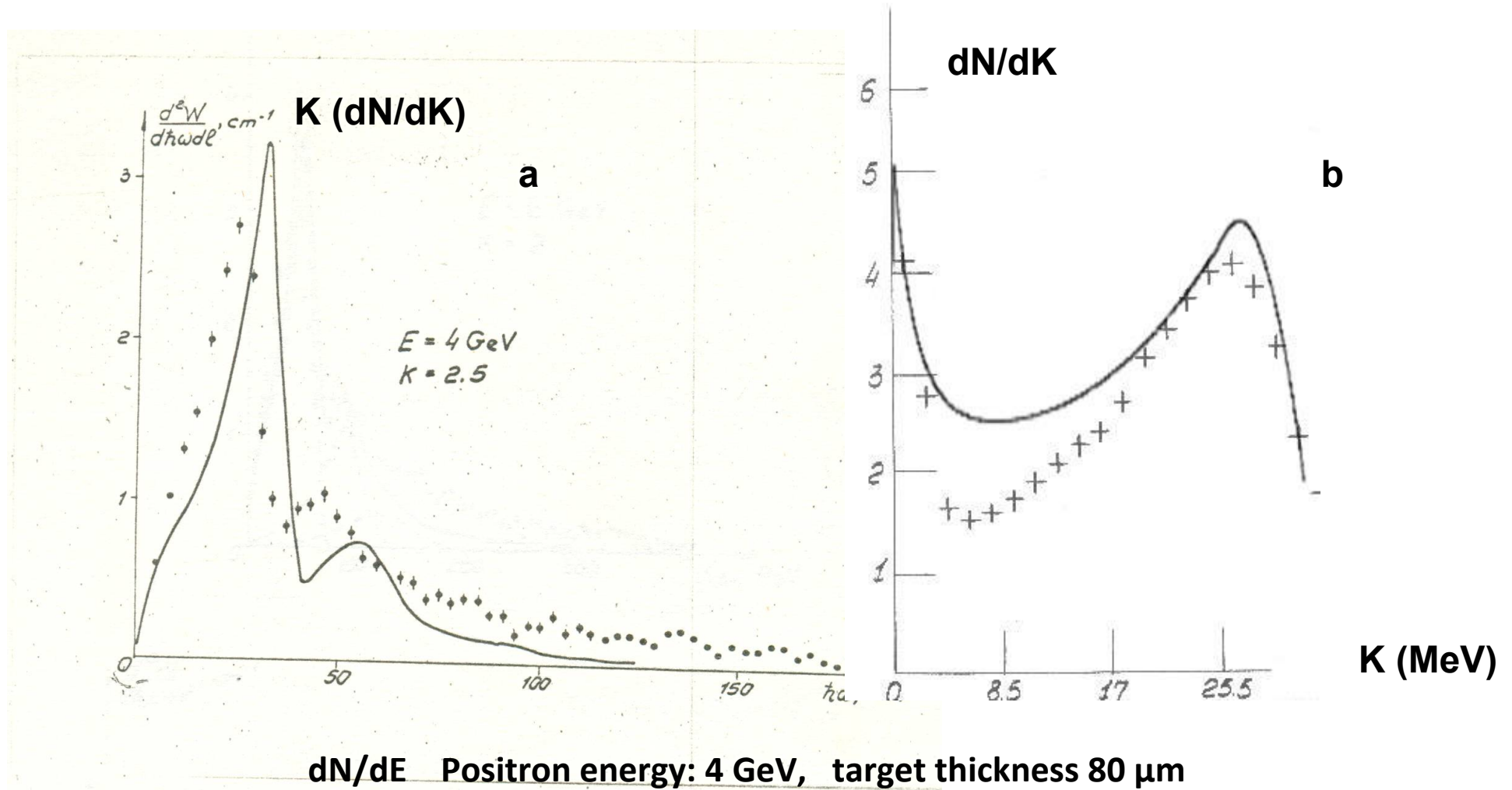
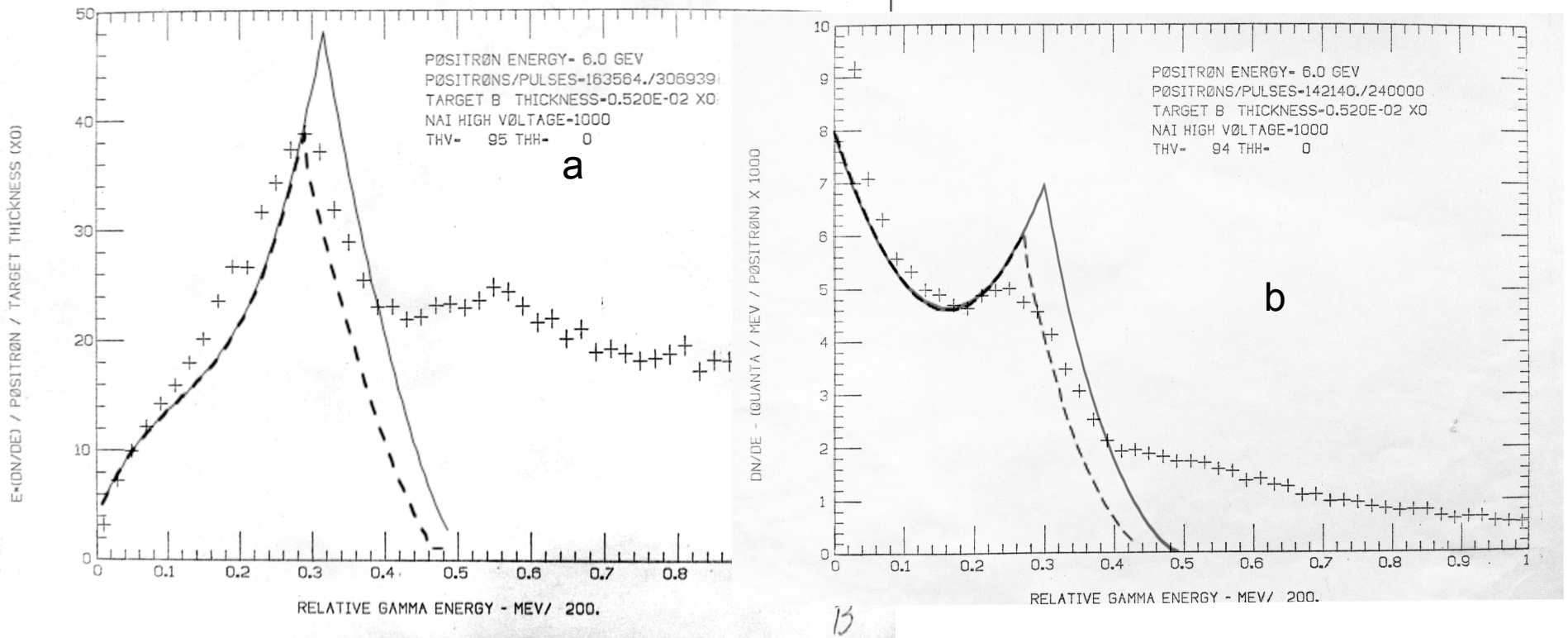


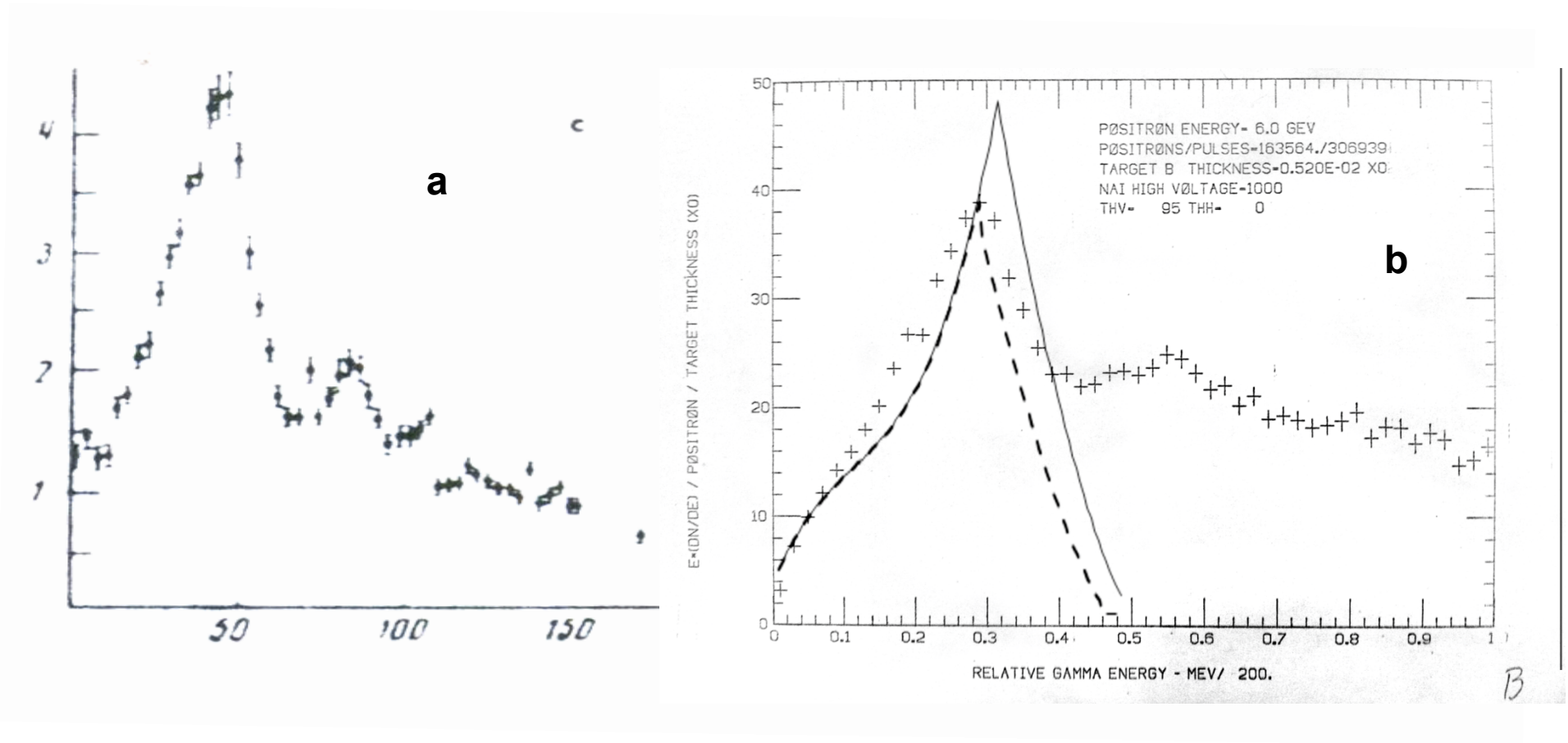
Fig 2. Crosses are the experimental results [3,4]; solid line of (a) and (b) are the theoretical results of [5] and [2] without and with taking into account the medium polarization, respectively.



**Fig. 3**

**K (dN/dK) (a) and dN/dK (b) for positron energy: 6 GeV, target thickness 600  $\mu\text{m}$**

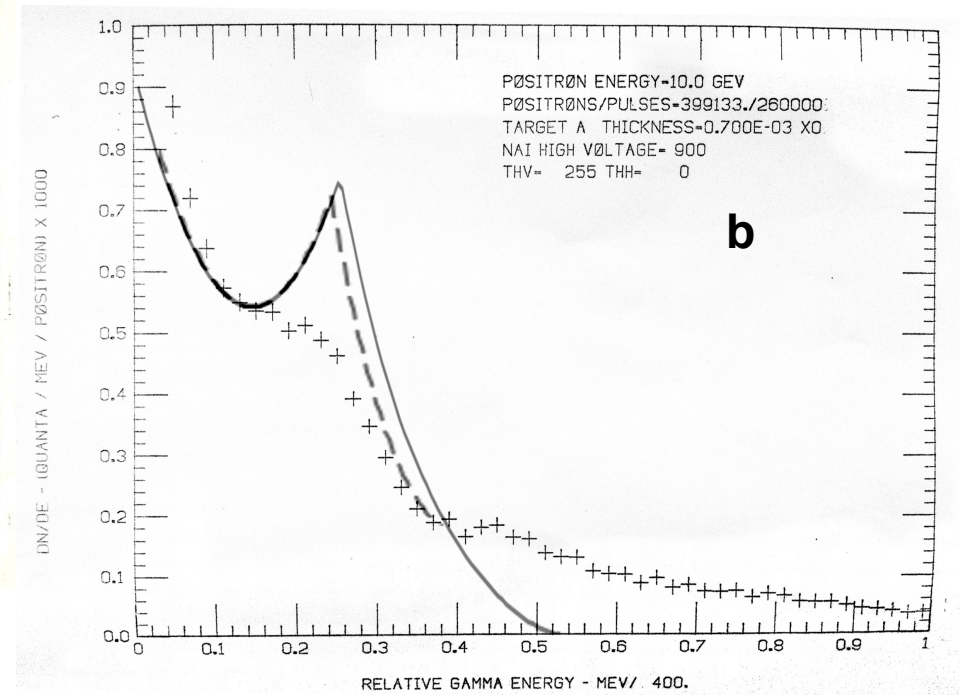
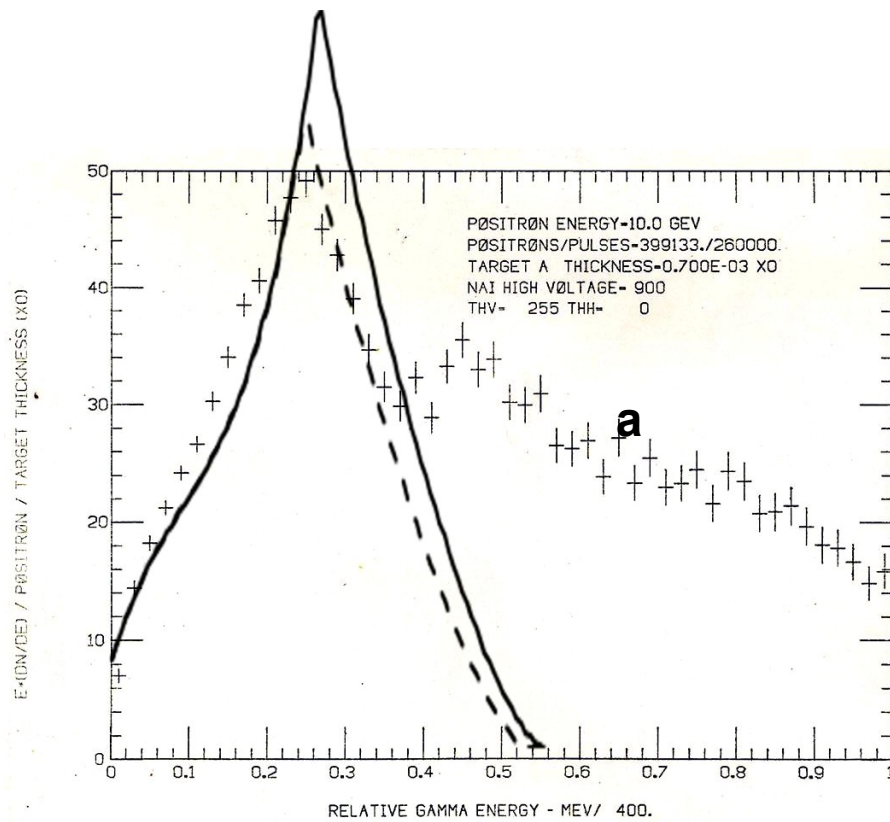
**Crosses are the experimental results; solid line is the theoretical calculation [2] without considering the medium polarization; dashed line is the theoretical calculation [2] considering the medium polarization**



**Fig. 4**

**$E(dN/dE)$  Positron energy: 6 GeV, target thickness (a) 80  $\mu\text{m}$  and (b) 600  $\mu\text{m}$**

**As it is seen there is a linear dependence on the radiator thickness, which shows that dechanneling length is much greater than the used radiator thicknesses**



**Fig. 5**

**(a)  $K (dN/dK)$  and (b)  $dN/dK$  for positron energy: 10 GeV, target thickness 84  $\mu\text{m}$**   
**Crosses are the experimental results; solid line is the theoretical [2] calculation without considering the medium polarization; dashed line is the theoretical calculation considering the medium polarization [2]**