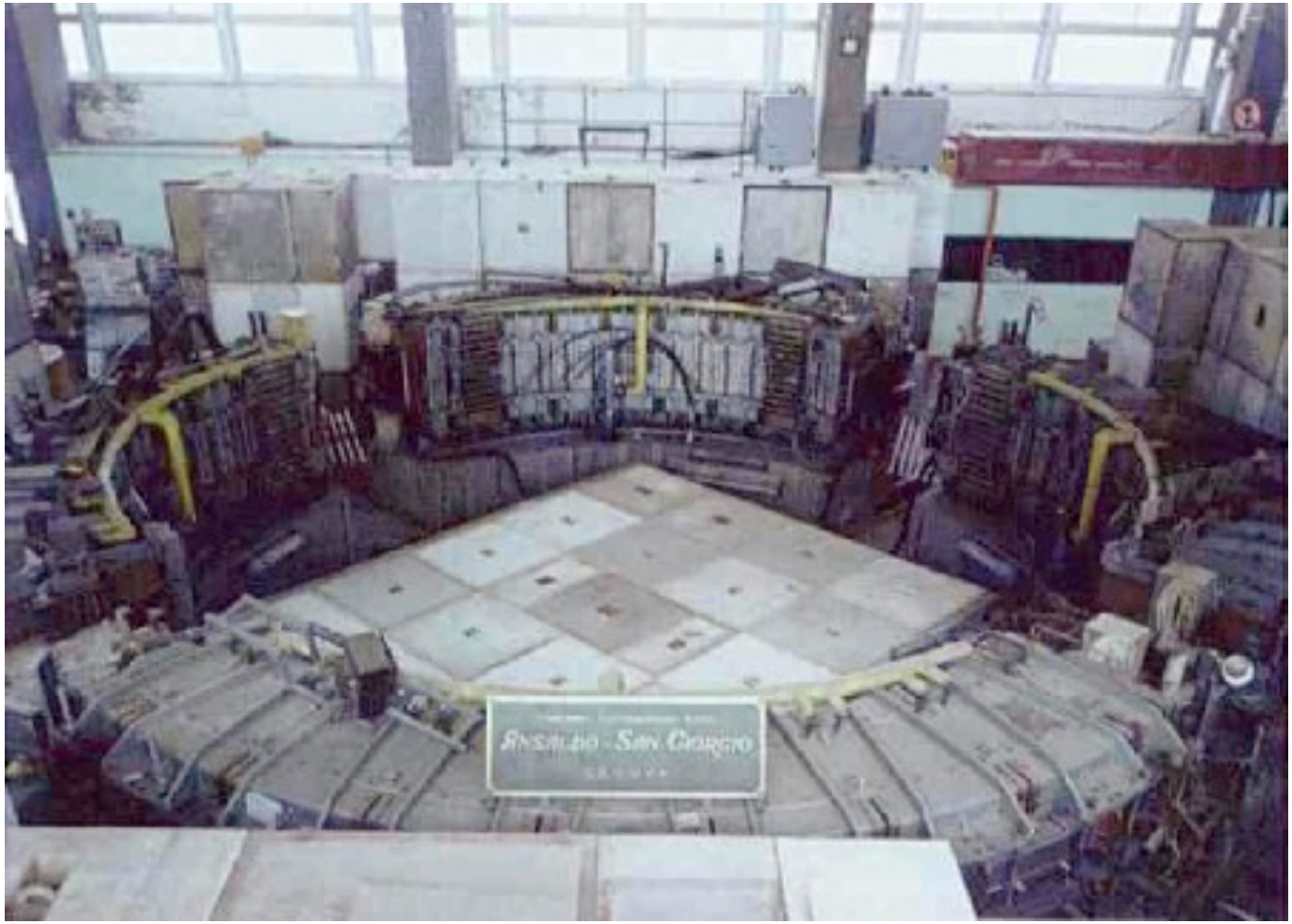
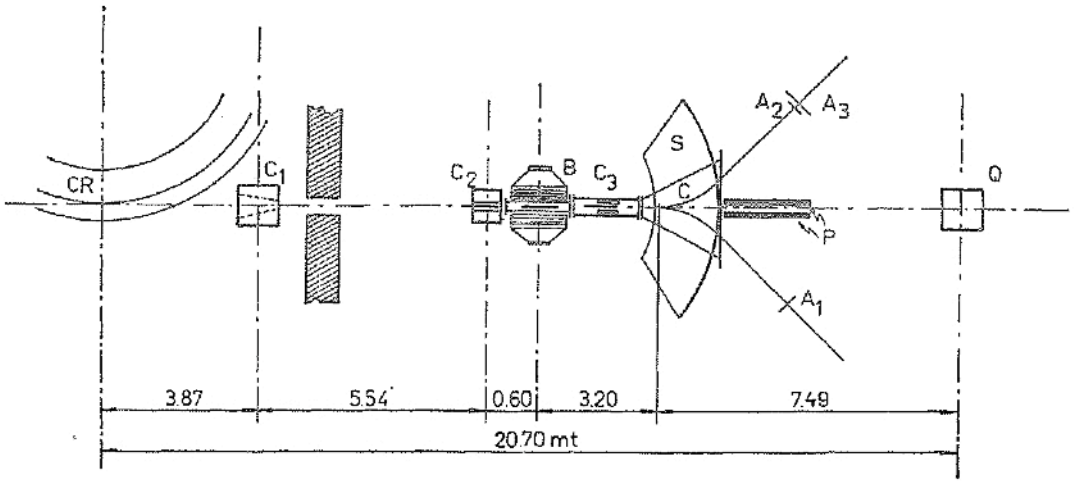
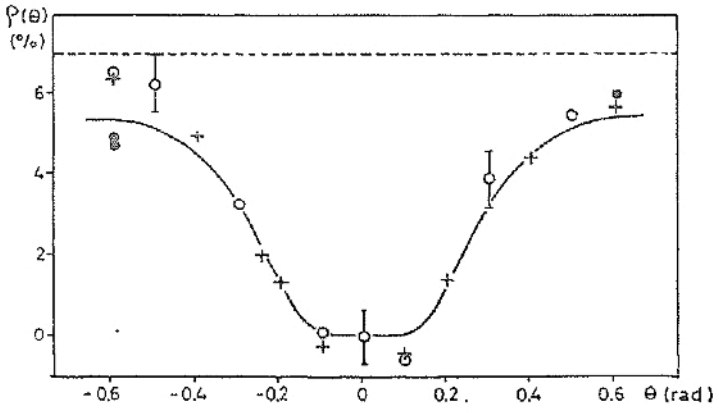
CHANNELING IN FRASCATI

CHANNELING 2008

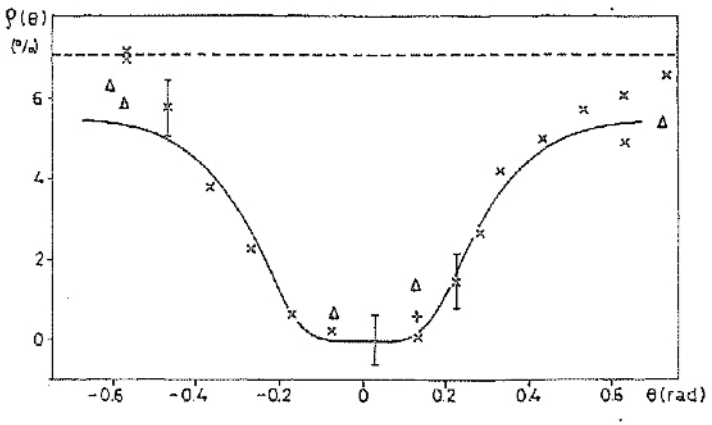
THE FRASCATI LABORATORY
1 GEV ELECTRON SYNCHROTRON




CR
C1
C2
B
C3
S
C
A2
A3
A1
P
Q
3.87
5.54
0.60
3.20
7.49
20.70 mt



a



b

FIG. 16. Relative variation of the electron pair production cross section in a silicon single crystal versus θ (angle between γ-ray direction and the crystal axis [100]). The solid line represents the function $\eta(\theta)$ given in the text. The central energy of the incident photon is $K = 910$ MeV. The experimental points represent ρ (θ) given in the text. Different runs of measurements are related to different shape of the dots. Parts (a) and (b) refer to rotations of the crystal about the horizontal and vertical axis, respectively (see the text or Ref. 10). The α value is unknown.

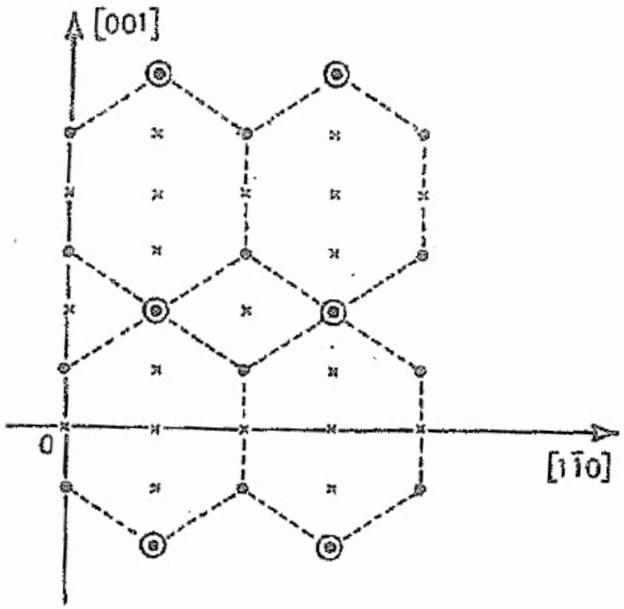
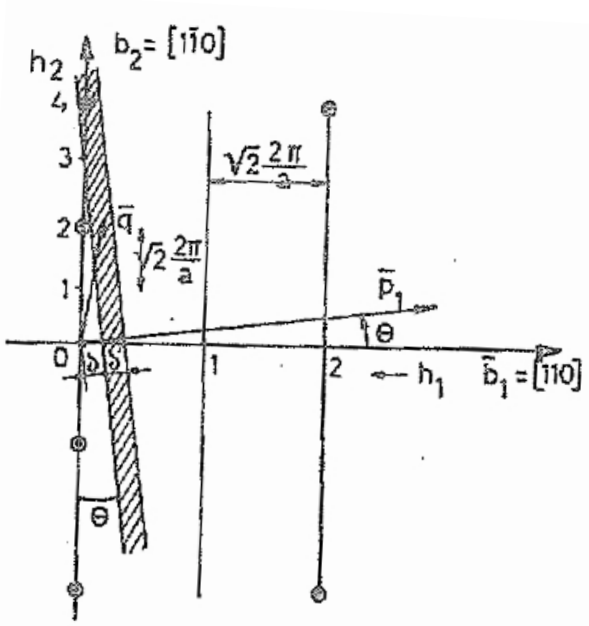


FIG. 4. The reciprocal lattice plane through $h_1 = 1$ for the diamond crystal (see text).



[20] M. May, Phys. Rev. 84, 265 (1951)

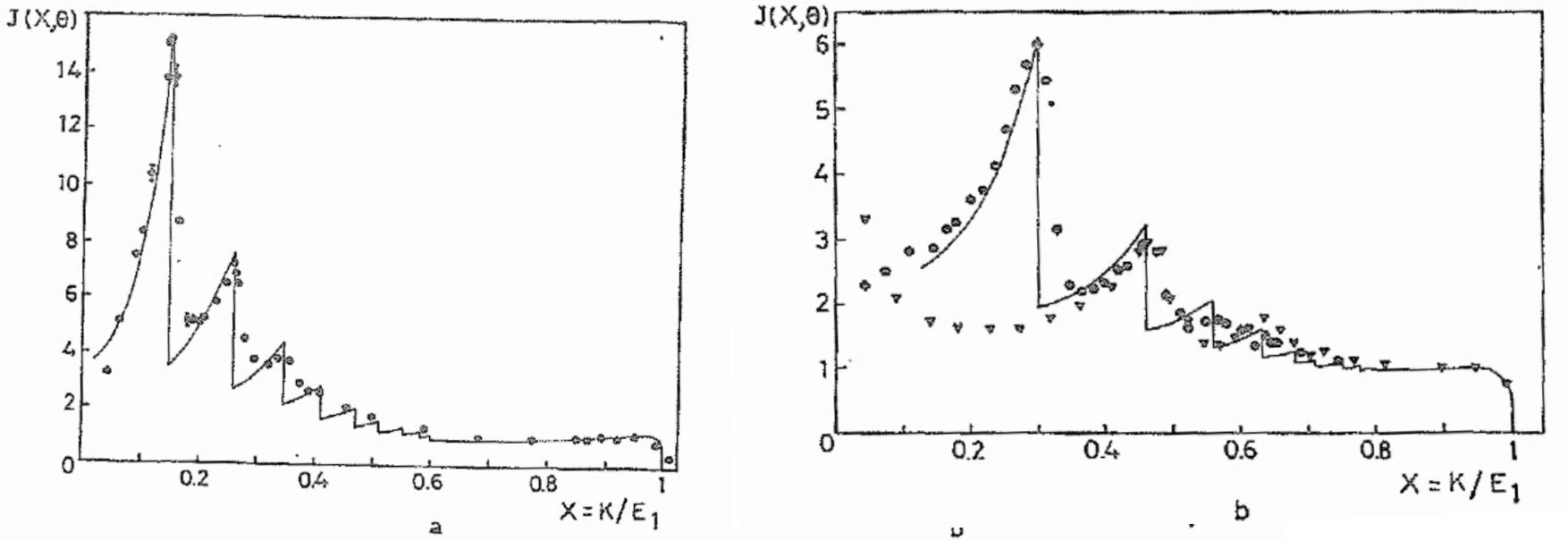


FIG. 18(a) Bremsstrahlung intensity for $E_0=1$ GeV in a diamond crystal. The incident momentum P_1 lies in the plane $[110][1\bar{1}0]$ and makes the angle $\theta=\theta_1=4.6\pm0.1$ mrad with the axis [110], i.e., $\alpha=\pi/2$. Solid line is the theoretical curve without any correction. The experimental points are given by the expression J_{expt}. given in the text. (b) The same situation as in (a), but $\theta=\theta_2=11.3\pm0.1$ mrad for the dots and solid line, and $\theta=\theta_3=22.9\pm0.1$ for the triangles (Frascati results, Ref. 19).

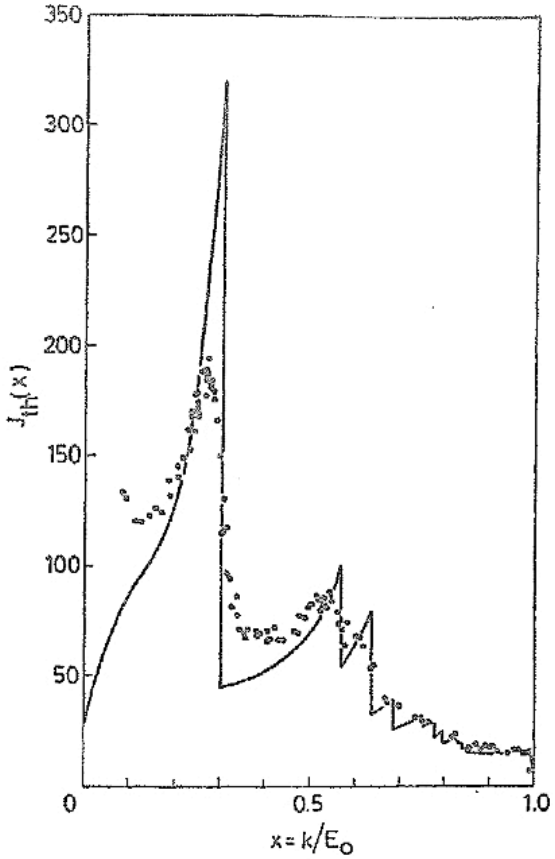


FIG. 19. HEB intensity from diamond crystal, for $\alpha=0$ $\theta=3.44$ mrad, $E_0=4.8$ GeV. Experimental data are compared with theoretical intensity not corrected for experimental resolution (Desy–Frascati collaboration, Ref. 23.)

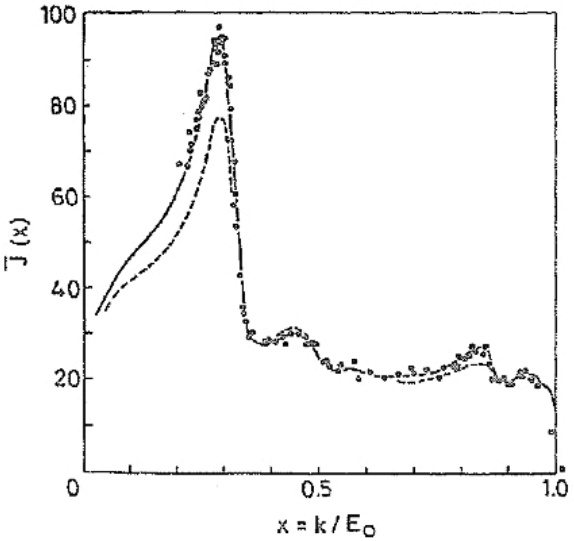
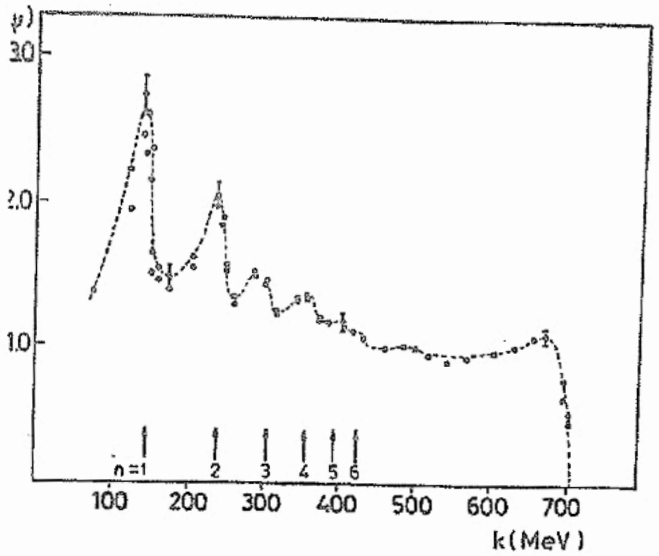


FIG. 21. HEB intensity and polarization from a diamond target. Experimental "one-point" spectrum compared with the averaged intensity and theoretical polarization values; $\alpha=1.5°$, $=50$ mrad, $E_0=4.8$ GeV (——) Hartree potential, (– – –). θ exponential potential. (Desy–Frascati collaboration results, Ref. 23.)



Intensity of the HEB in a silicon single crystal; ıd, $\alpha=0$, $E_0=720$ MeV. The circles are the experits corrected for vertical losses of the counters. (Tokyo Ref. 25.)

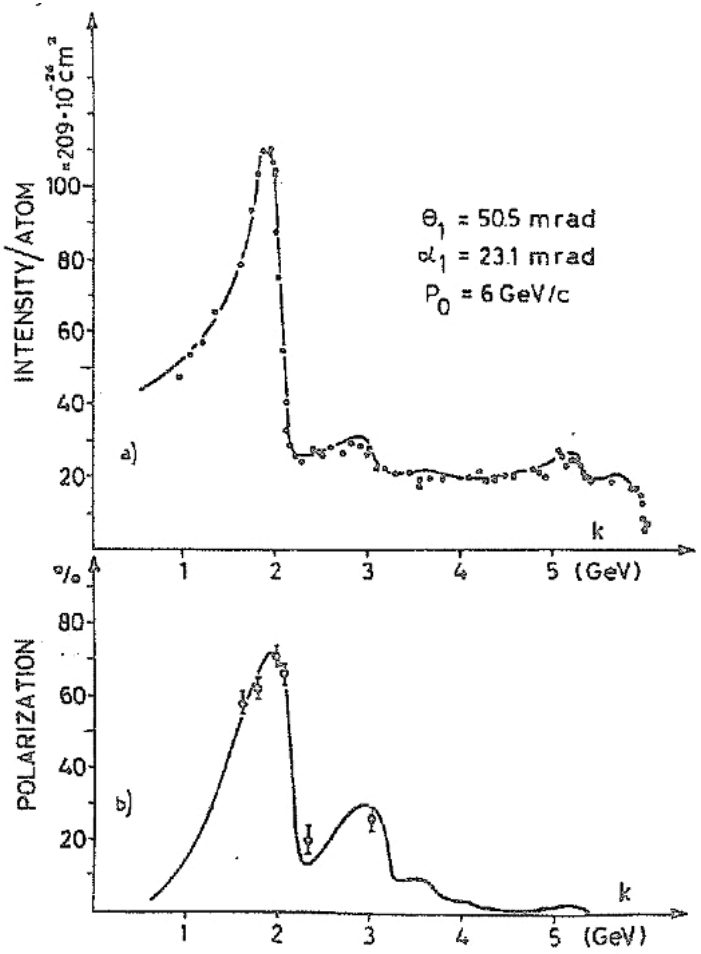


FIG. 22. Measurement of the polarization of the coherent HEB by the analyzing crystal method. (a) "One-point" spectrum obtained with $\theta=50.5$ mrad, $\alpha=23.1$ mrad, $E_0=6$ GeV. (b) Results of the polarization measurements along the former spectrum. (Desy results, see Ref. 24.)

The LNF Pair spectrometer

- The LNF Pair Spectrometer has a lower threshold for gamma ray energy detection of 50 Mev.The soft radiation of electron channeling is not visible.
- The only manifestation of the channeling was seen during the the beam centering with an Xray sensitive film.When the crystal axis and the electron beam were at zero angle the film was extremely overexposed.

The Channeling detected by X rays sensitive film

- Our collegue Gianpaolo Murtas indeed suggested to investigate more deeply the radiation emission in the condition of electron beam and crystal axis exactly parallel. The program already existing of polarization measurement and the use of polarized photon beam for photoproduction experiment delayed this search.
- The coherent bremmstrahalung and the channeling process did not find the future unification at that time