Note on the Rochester Cyclotron

S. W. BARNES, A. F. CLARK, G. B. COLLINS, C. L. OXLEY, R. L. MCCREARY, J. B. PLATT, AND S. N. VANVOORHEES
Department of Physics, University of Rochester, Rochester, New York
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THE 130-inch cyclotron has accelerated protons out to a radius of 58½″ (approximately the $n=0.2$ point) or to an estimated energy of 240 Mev since the first of the year. Measurement of the C'' activity of a carbon-tipped probe indicates average currents of about 0.1μa at this radius and radio-autographs of the target show the beam to be about 1″ in height and well centered vertically on the probe. Eastman Kodak NTB plates placed along the probe show, among many proton recoil tracks, π^- and π^+ tracks.

About 15 kw of r-f power for the Dee is furnished by a grounded grid oscillator with feedback through the Dee. The natural frequency of the Dee is varied from 26 to 18 megacycles by a rotating condenser. The condenser which is in the Dee tank consists principally of a rotor of copper-plated, thin-toothed zircon disks mounted on a shaft parallel to the back edge of the Dee and a Dee stator which is on the back edge of the Dee. The magnetic drag of this rotor up to 2000 r.p,m. is small compared to the power taken by the rotor shaft seals. The copper-plated ceramic disks already give promise of satisfactory life.

Ion loading of the Dee is obviated by a negatively biased grid structure covering the linear above and below the Dee. Globar resistors break the grid into lengths too short to resonate to the Dee frequencies.

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Fluorescence of Anthracene Excited by High Energy Radiation*

LOUISE ROTH
Purdue University, Lafayette, Indiana
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SINGLE crystals of anthracene were prepared by a method similar to that of P. R. Bell[1] and used for scintillation counters. At the suggestion of K. Lark-Horovitz, the spectra of the scintillations produced by high energy bombardment have been studied and compared with the fluorescence bands produced by ultraviolet excitation.

Spectrograms of the fluorescence excited by copper $K\alpha$-radiation, 10-Mev deuterons, and a 10-millicurie radium-beryllium source were made with a small Hilger quartz spectrographs using Eastman 103–0 plates. For the spectrum with x-ray excitation a crystal was mounted at the tube slit at an angle of about 45 degrees to the beam, and the visible fluorescence was focused by means of an aluminum mirror on the collimator lens of the spectrograph. A similar mounting was used for bombardment with the cyclotron beam. For the radium-beryllium exposure the crystal was fastened over the spectrograph slit with the radiation source in contact with it. No attempt was made to distinguish between the effects of neutrons and gamma-rays. A five-minute exposure to x-rays with a 0.1-millimeter slit was sufficient to bring out the bands found. A ten-minute exposure was used with the deuteron beam and twenty-four hours with radium-beryllium.

In each case three bands were observed between 4120 and 4720A with the most intense band at 4440A. No other bands were found between 2500 and 5000A. The wave-lengths of band intensity maxima were determined. The values found agree with those observed using ultraviolet excitation to the same extent as the ultraviolet values agree among themselves. Wave-length values in Table I, with the exception of the writer's, are for ultraviolet excitation.

To correlate the known bands with the counting properties, counts were taken with a series of Wratten filters placed between the scintillating crystal and the 931-A photo-multiplier tube using a Co^{60} gamma-source at a constant distance from the crystal. Counts were taken at different pulse heights with and without each filter, and a graph of counts against discriminator setting was made. Since the discriminator setting fixes the minimum pulse voltage to be registered, it is proportional to the intensity of the weakest scintillations which are recorded. Thus it is possible to determine the transmittance for a given filter by determining the discriminator setting for a fixed number of counts with and without the filter.

TABLE I. Wave-lengths of intensity maxima for anthracene.

Data of	Intensity maxima in angstrom units							
Dowell[a]	—	—	4250	—	4490	—	4740	4980
Ganguly[b]	4030	—	4220	4380	4450	—	—	—
Ganguly[c]	4000	4140	—	4400	—	—	4680	—
Kortüm and Finkh[d]	4000	—	4200	4400	—	—	4700	4950
Obreimov[a]	—	4090	—	4340	—	4610	4750	4950
Pringsheim[e]	4025	—	4220	—	4450	—	4735	5090
Writer	—	—	4240	—	4440	—	4700	—

[a] Shishlovskii, Comptes Rendus **15**, 29 (1937).
[b] S. C. Ganguly, Nature **153**, 652 (1944).
[c] S. C. Ganguly, J. Chem. Phys. **13**, 128 (1945).
[d] Kortüm and Finkh, Zeits. f. physik. Chemie **B52**, 263 (1942).
[e] P. Pringsheim, Trans. Faraday Soc. **35**, 28 (1939).

No counts above background occurred when the fluorescence range was blocked by filters. For Wratten filter 2-A the transmittance found experimentally was 0.74. According to the manufacturer, the average transmittance of this filter between 4200 and 4700A is 0.78. The agreement is satisfactory; the slight difference may be due to the fact that the transparency of the filter drops rather sharply just below 4200A, whereas the fluorescence bands extend to about 4120A.

The above investigations again point to the fact that the fluorescence of anthracene is particularly suited to scintillation counting with a 931-A or 1P-21 photo-multiplier tube, which are most sensitive in the spectral range 3500–4500A.

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[1] P. R. Bell, Phys. Rev. **73**, 1405 (1948).

The β-Spectrum of H^3

G. C. HANNA AND B. PONTECORVO
Chalk River Laboratory, National Research Council of Canada, Chalk River, Ontario, Canada
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THE proportional counter technique previously described[1,2] has been used to study the β-spectrum of H^3 an investigation of which has recently been reported by Curran *et al.*[3]

The two counters *I* and *II* described in reference 2 were used. The fillings are given in Table I.

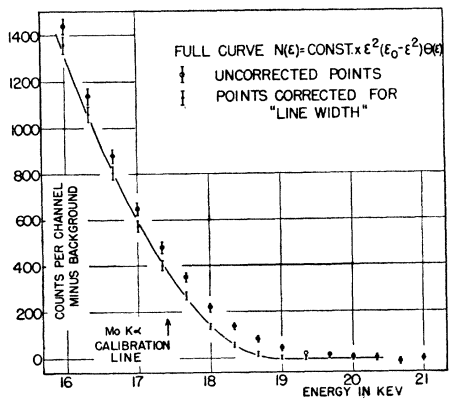

FIG. 1. The spectrum of H^3 in the region of the end