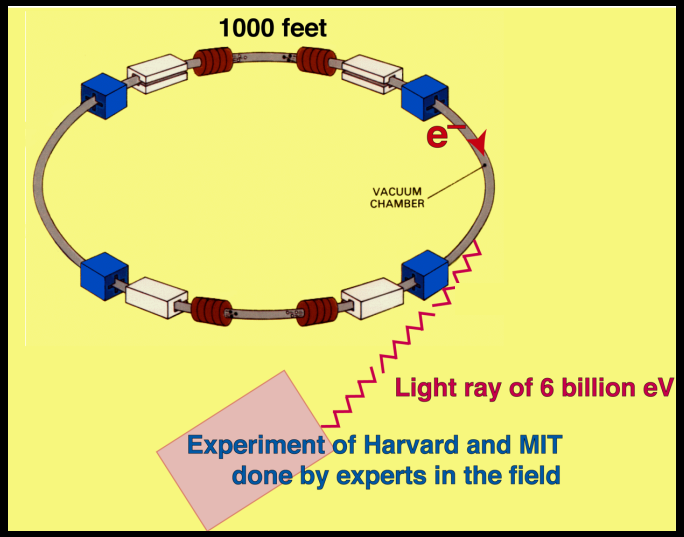
In Celebration of Professor Ulrich Becker

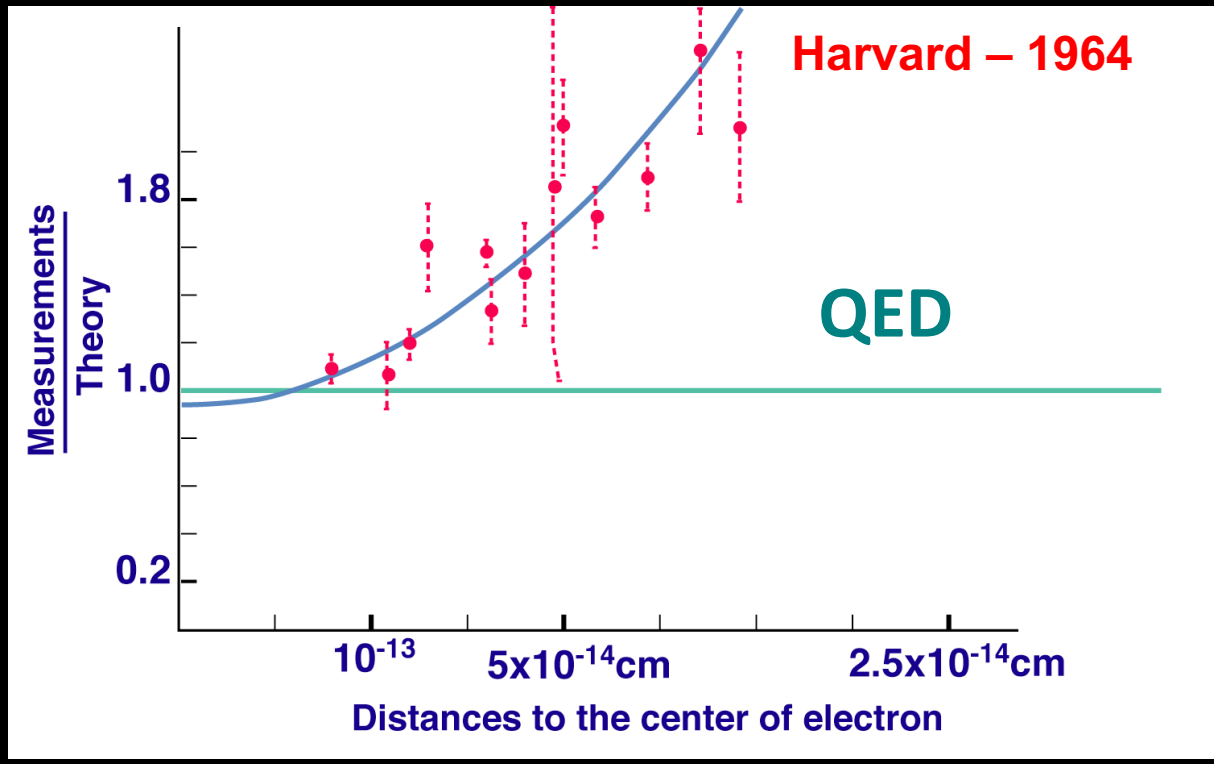
8 October 2022

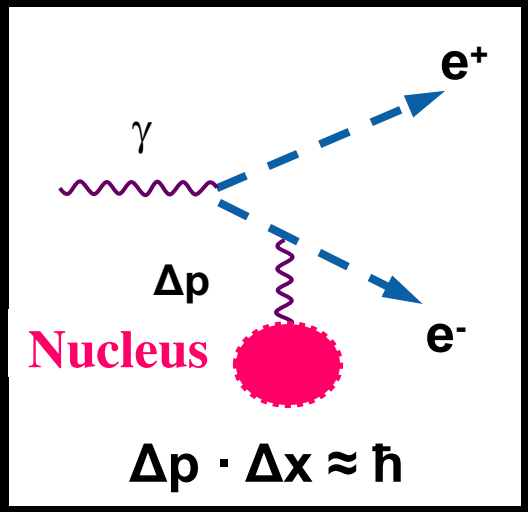
Samuel Ting

1966, First Experiment with Ulrich Becker- tests of QED at DESY, Hamburg

Cambridge Electron Accelerator







This shows that the electron has a radius of 10^{-13} to 10^{-14} cm.

Most importantly, this experiment was independently confirmed by a group at the Cornell Electron Accelerator.

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VALIDITY OF QUANTUM ELECTRODYNAMICS AT SMALL DISTANCES

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and

S. Friedlander, C. Jordan, and C. C. Ting†
Department of Physics, Columbia University, New York, New York
(Received 7 November 1966)

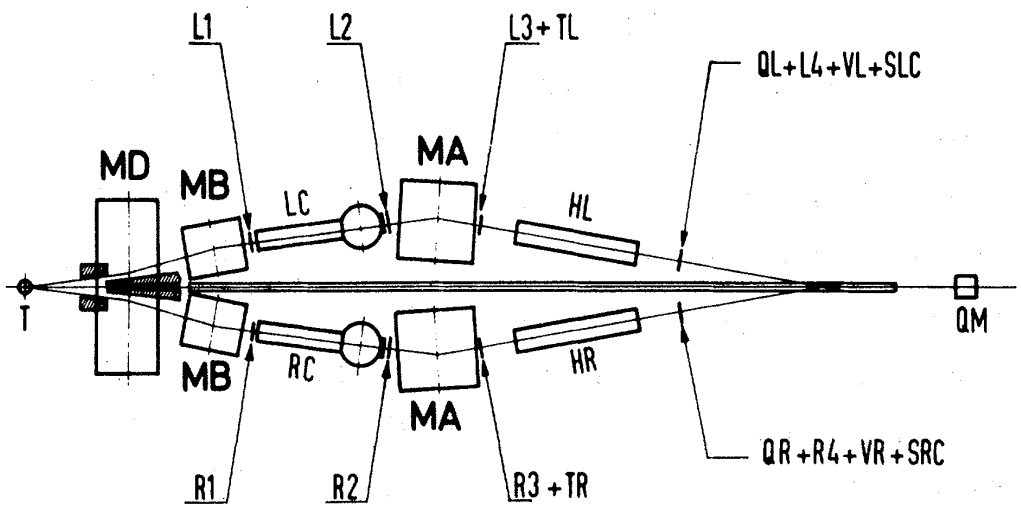
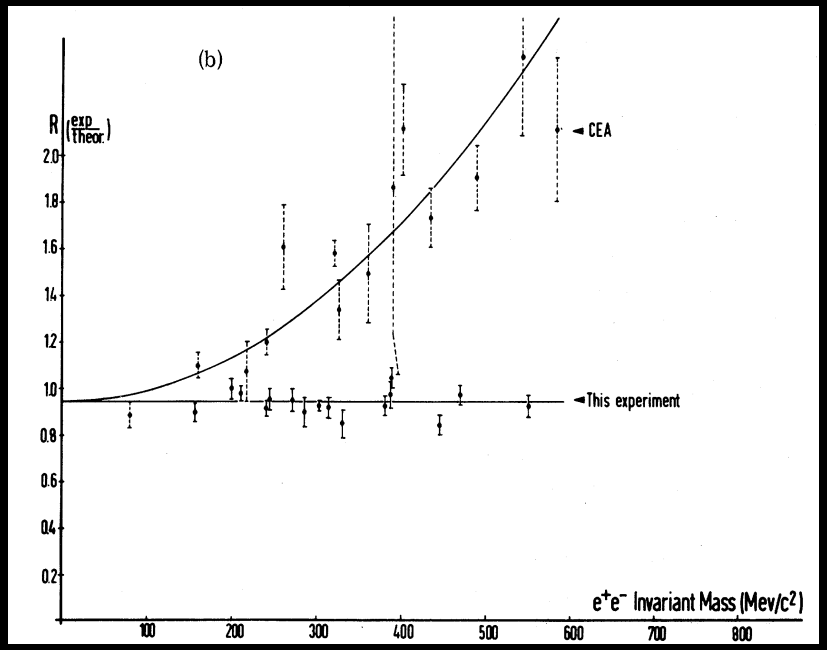


FIG. 1. Plan view of the spectrometer.



Unique features

10^{11} γ/sec

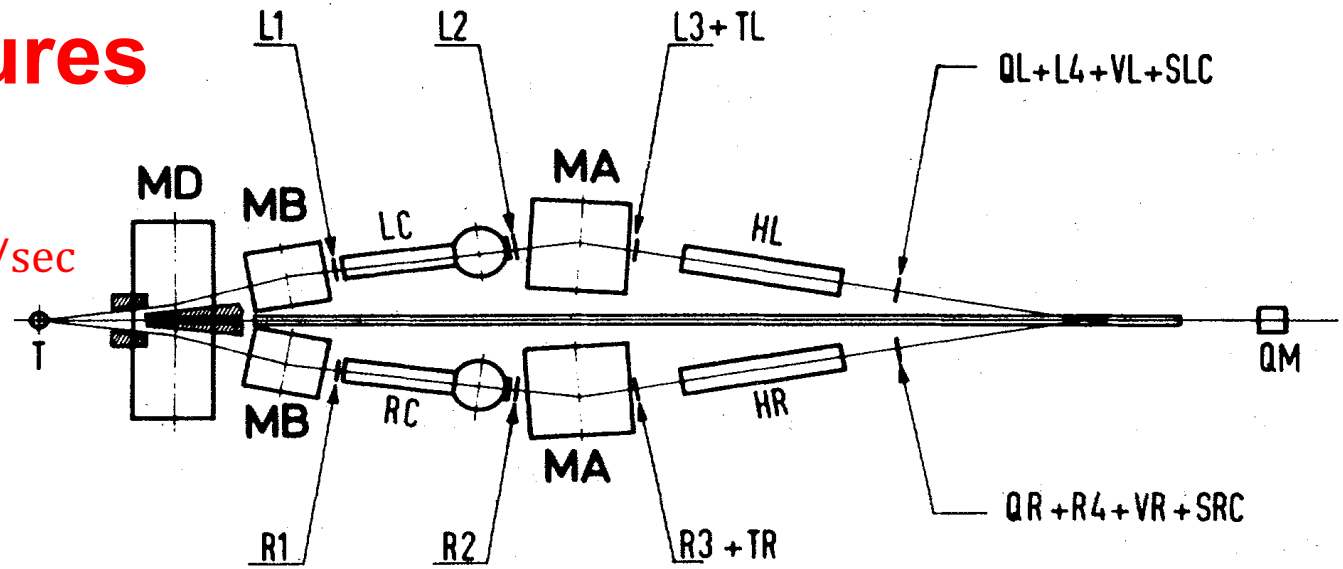


FIG. 1. Plan view of the spectrometer.

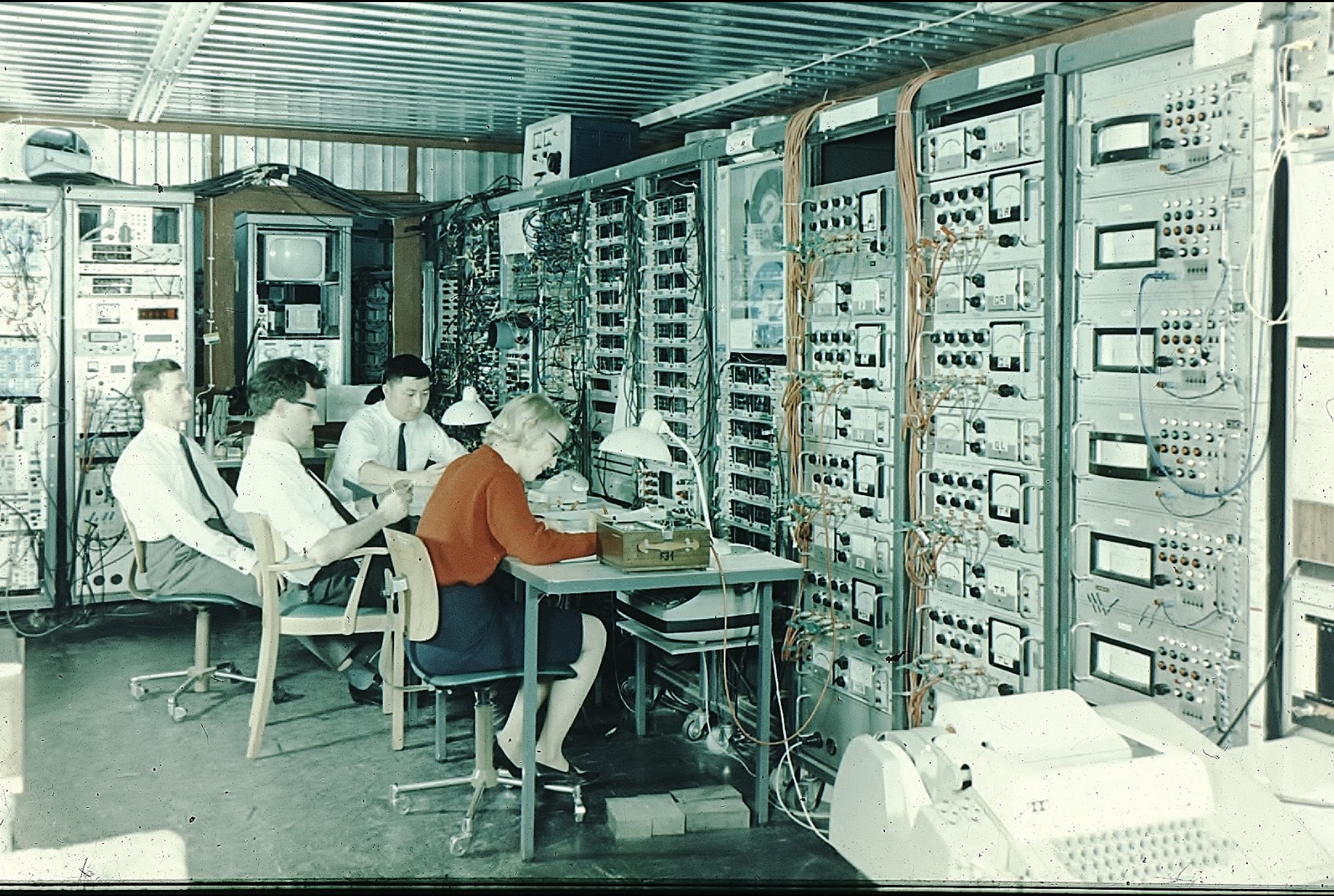
1. The detectors (L1, L2, L3 …) do not see the target so they are not exposed to neutrons and gamma-rays and other backgrounds from the target (T).

2. The acceptance is defined by the counters, not by the aperture of the magnet.

3. Using two Cherenkov counters (LC, HL) to identify $e^{\pm}$ on each arm. The two counters are separated by magnets (MA) so that background $e^{\pm}$ produced from interactions in the first counter (LC) are swept away by the magnet (MA) and the $e^{\pm}$ identification of the two counters (LC, HR) are independent.

4. Using calorimeters (SLC) to measure the energy (E), require E=P to reject knock on from Cherenkov counter (LC, HL).

The development of this type of detector eventually led to the J-Particle experiment and AMS experiment.



Control room at DESY with Frl. Ingrid Schulz, U. Becker, M. Rohde and S. Ting,

The group at DESY experiment

Photoproduktion der neutralen Vektor-Mesonen ρ^0 und φ

in Vorwärtsrichtung

an verschiedenen Atomkernen

Dissertation

zur Erlangung des Doktorgrades

der Mathematisch-Naturwissenschaftlichen Fakultät

der Universität Hamburg

Lebenslauf

Am 17.12.1938 wurde ich als Sohn des Prokuristen Georg Becker und seiner Gattin Auguste, geb. Bühner, in Dortmund geboren.

Von Herbst 1944 bis Ostern 1949 besuchte ich mit kriegsbedingten Unterbrechungen die Grundschule in Rauschenberg und bis Ostern 1952 das Marburger Oberrealgymnasium. Anschließend war ich Schüler des Leibniz-Gymnasiums in Dortmund, welches ich Ostern 1958 mit dem Reifezeugnis verließ.

Vom S.S. 1958 an studierte ich an der Philipps- Universität Marburg und legte dort am 1.6.1960 die Diplom-Vorprüfung ab. An der Universität Hamburg setzte ich mein Studium fort.

Im W.S. 1961 begann ich am II.Institut für Experimentalphysik der Universität Hamburg unter Anleitung von Professor P.Stähelin meine Diplomarbeit mit dem Thema: "Über die Eigenschaften von Funkenkammern und Hochspannungstriggern", die ich am 2.3.1964 mit der Diplom-Hauptprüfung abschloß.

Seit dem 1.4.1964 bin ich wissenschaftlicher Mitarbeiter des Deutschen Elektronen Synchrotrons in Hamburg-Bahrenfeld und arbeite unter Professor P.Stähelin an meiner Dissertation.

Am 29.4.1966 heiratete ich Fräulein Gerda Barthel. Am 3.3.1967 wurde unsere Tochter Katharina geboren.

Scientific American 225 (1971) 95

$$\gamma + A \rightarrow \rho + A$$
$$\hookrightarrow \pi\pi$$

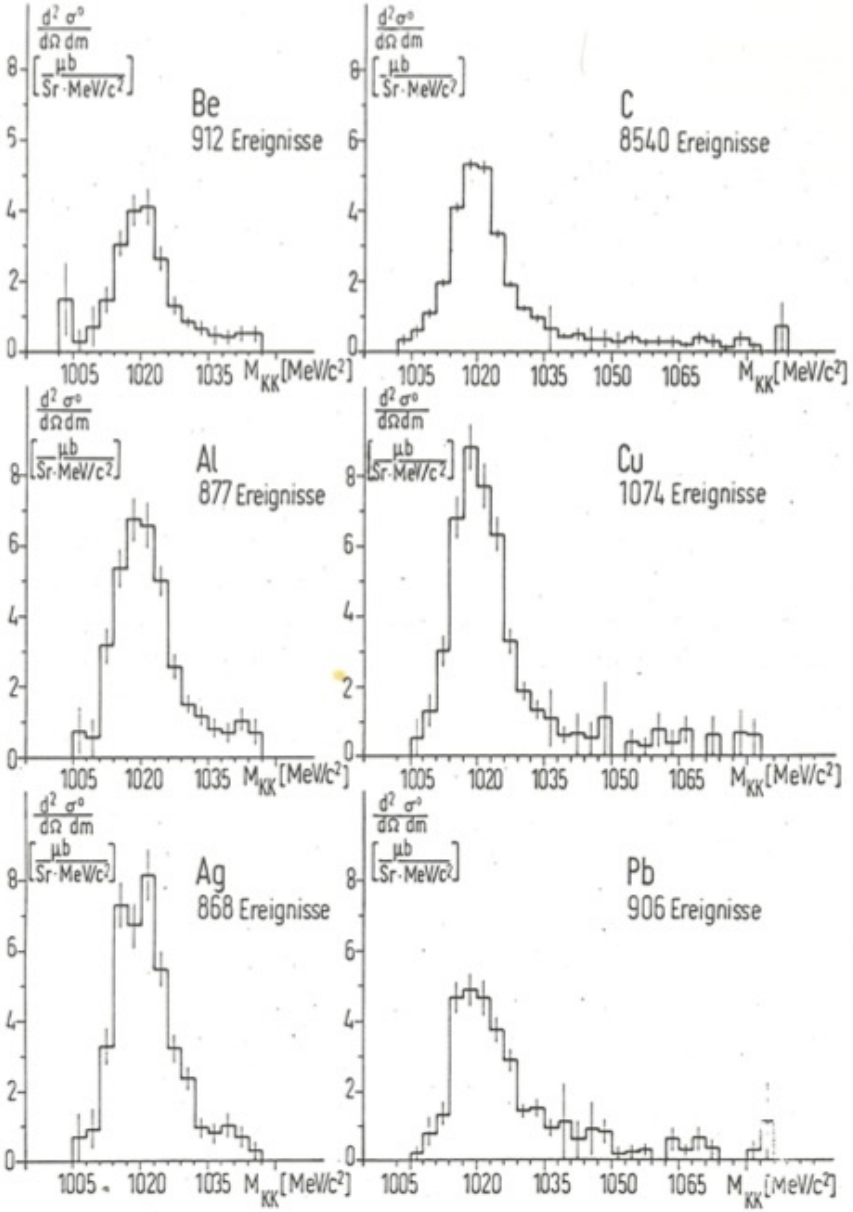
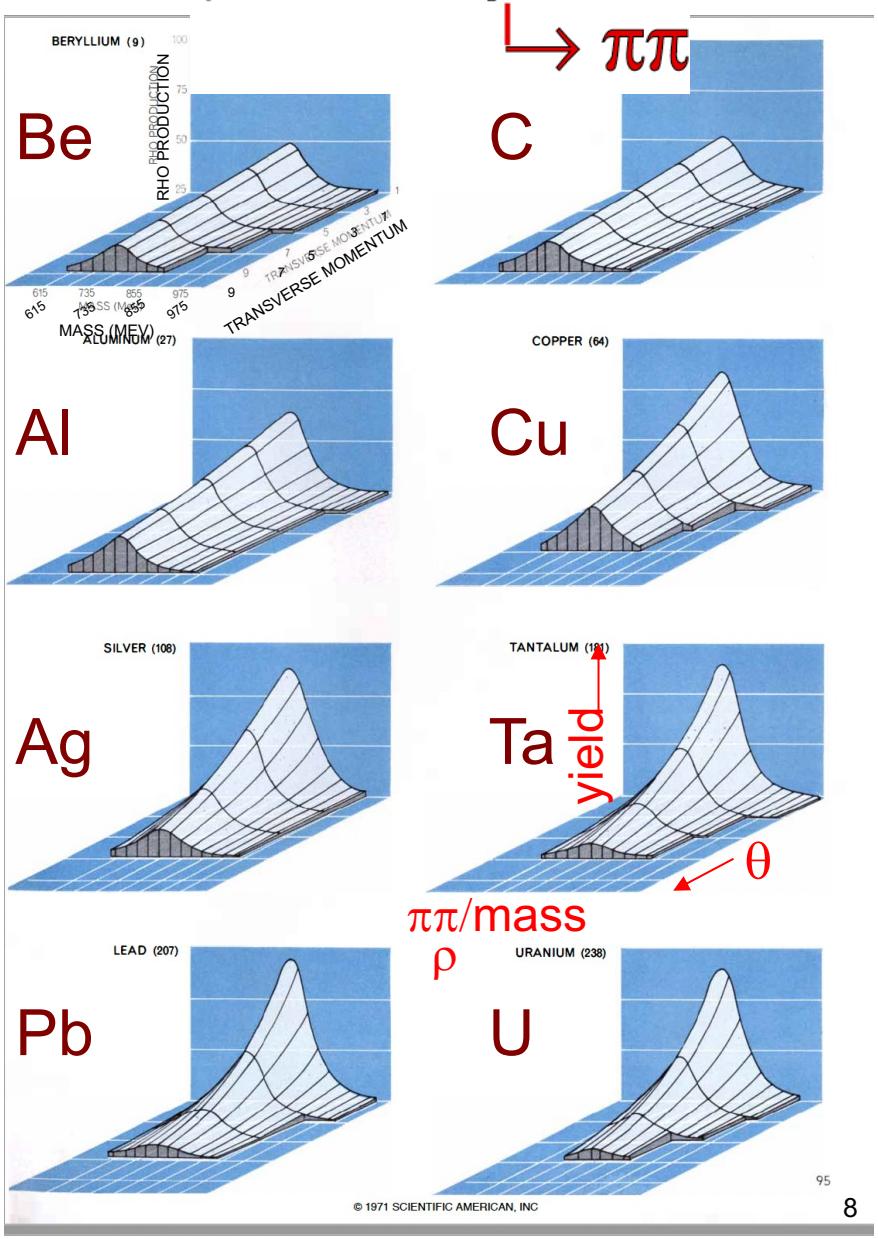


Abb.18 Differentieller Wirkungsquerschnitt der Photoproduktion geladener K-Paare als Funktion der invarianten Paarmasse



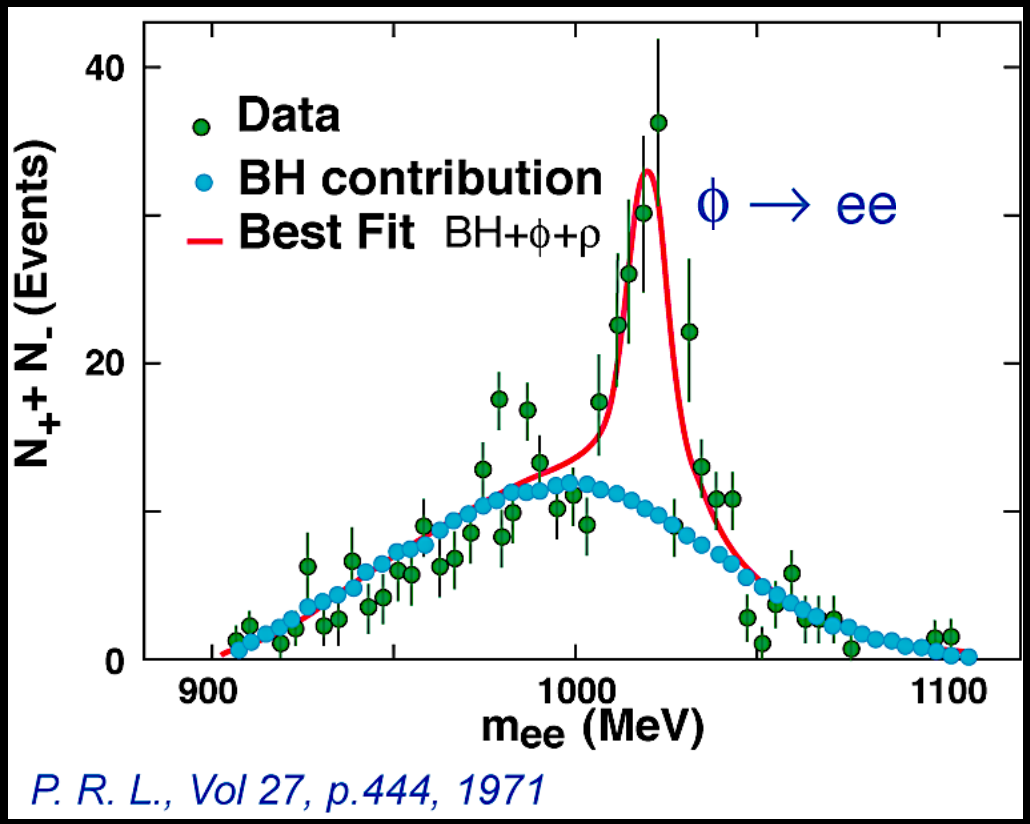
1968 Dinner in celebration of U. Becker's Ph.D.

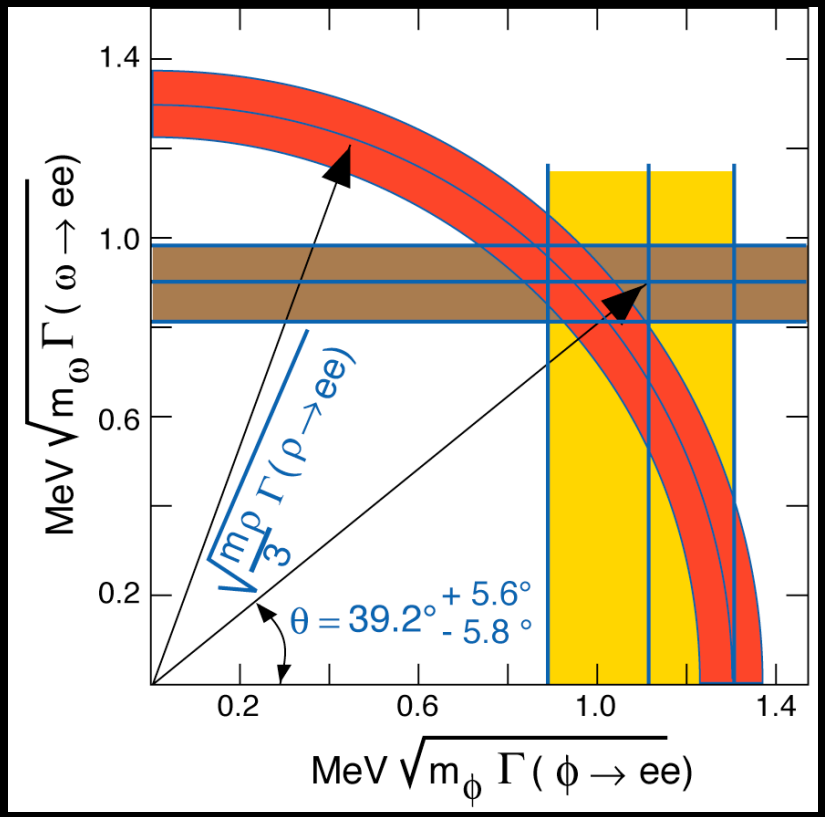
1972, Second Experiment with Ulrich Becker

Discovery of the J Particle

Weinberg's First sum rule

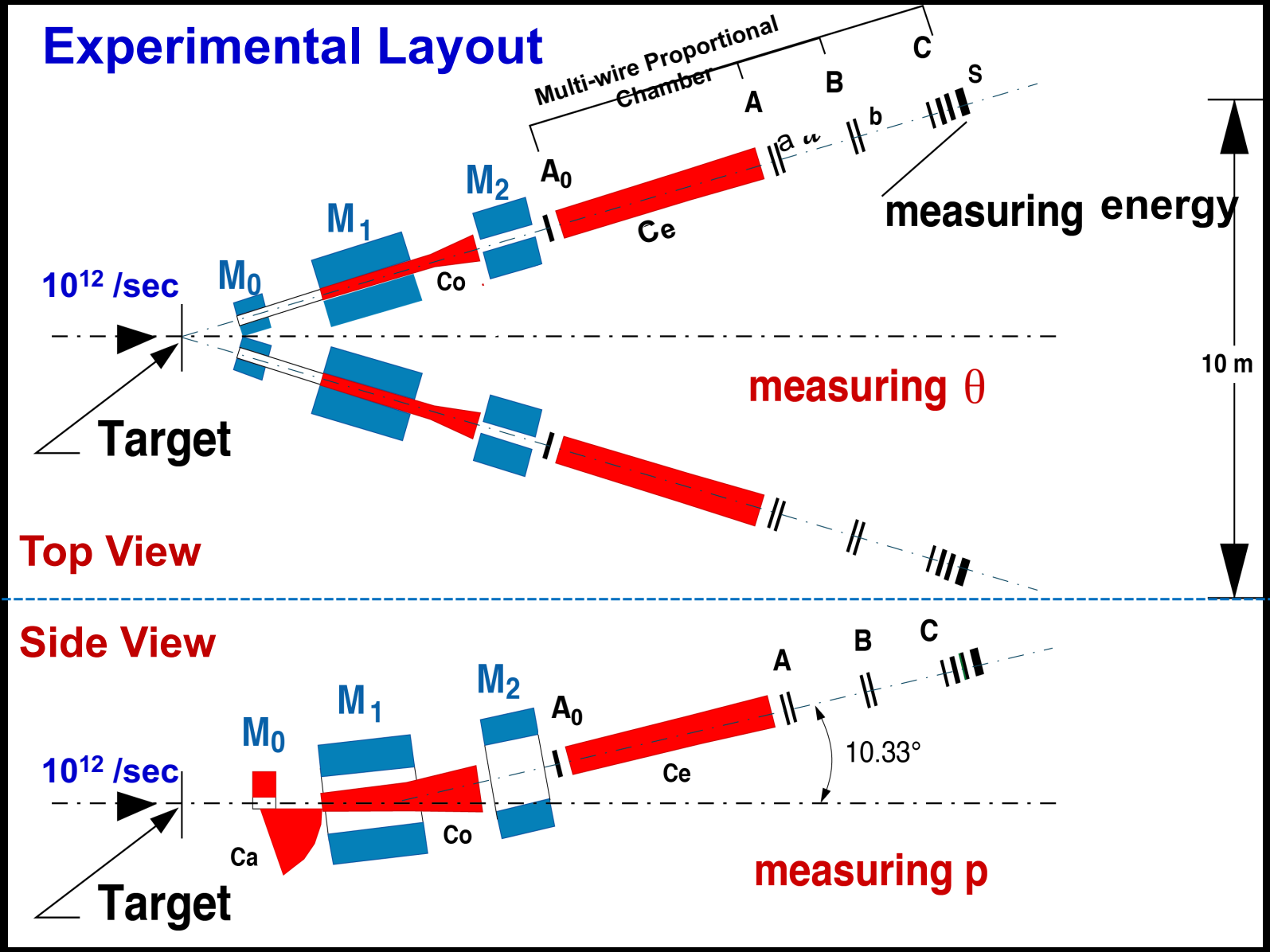
$$\frac{1}{3} m_\rho \Gamma(\rho \to ee) = m_\omega \Gamma(\omega \to ee) + m_\phi \Gamma(\phi \to ee).$$





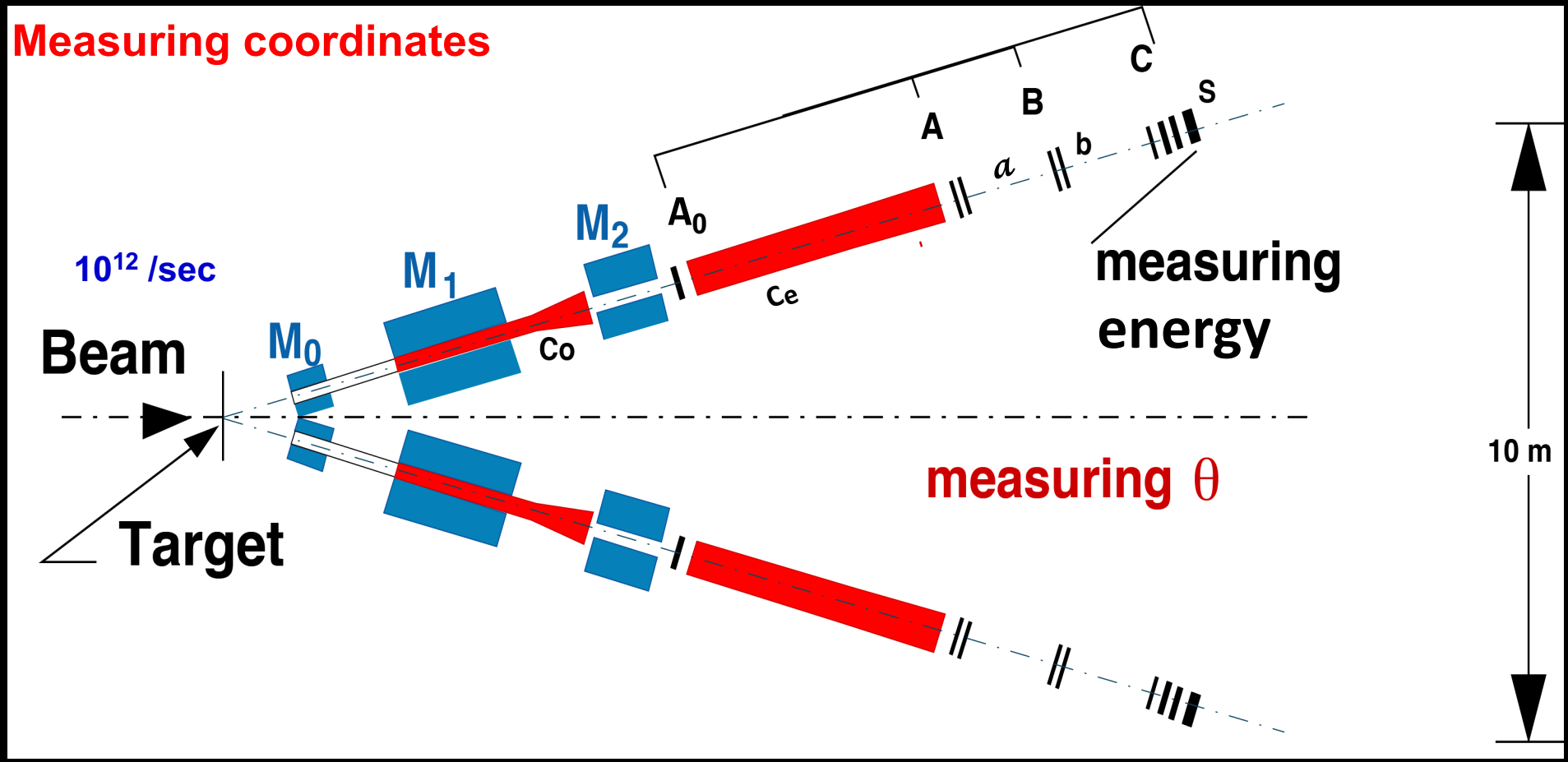
Question : Why do all vector mesons have a mass of 1 GeV?
Where are the heavier vector mesons?

To search for heavier vector mesons we moved to Brookhaven National Laboratory.

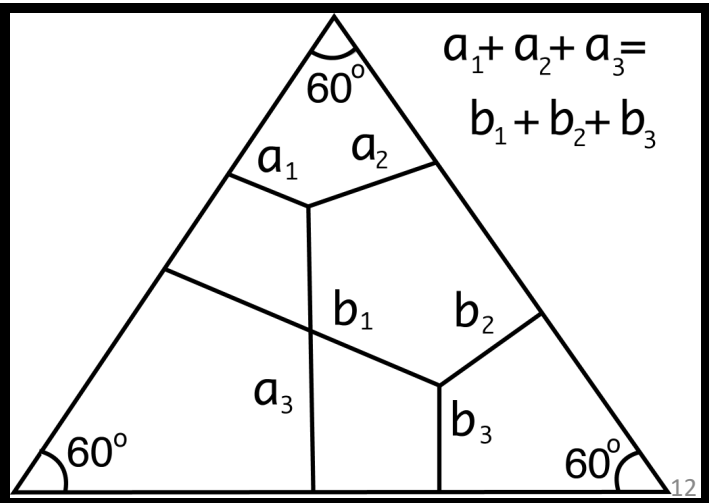


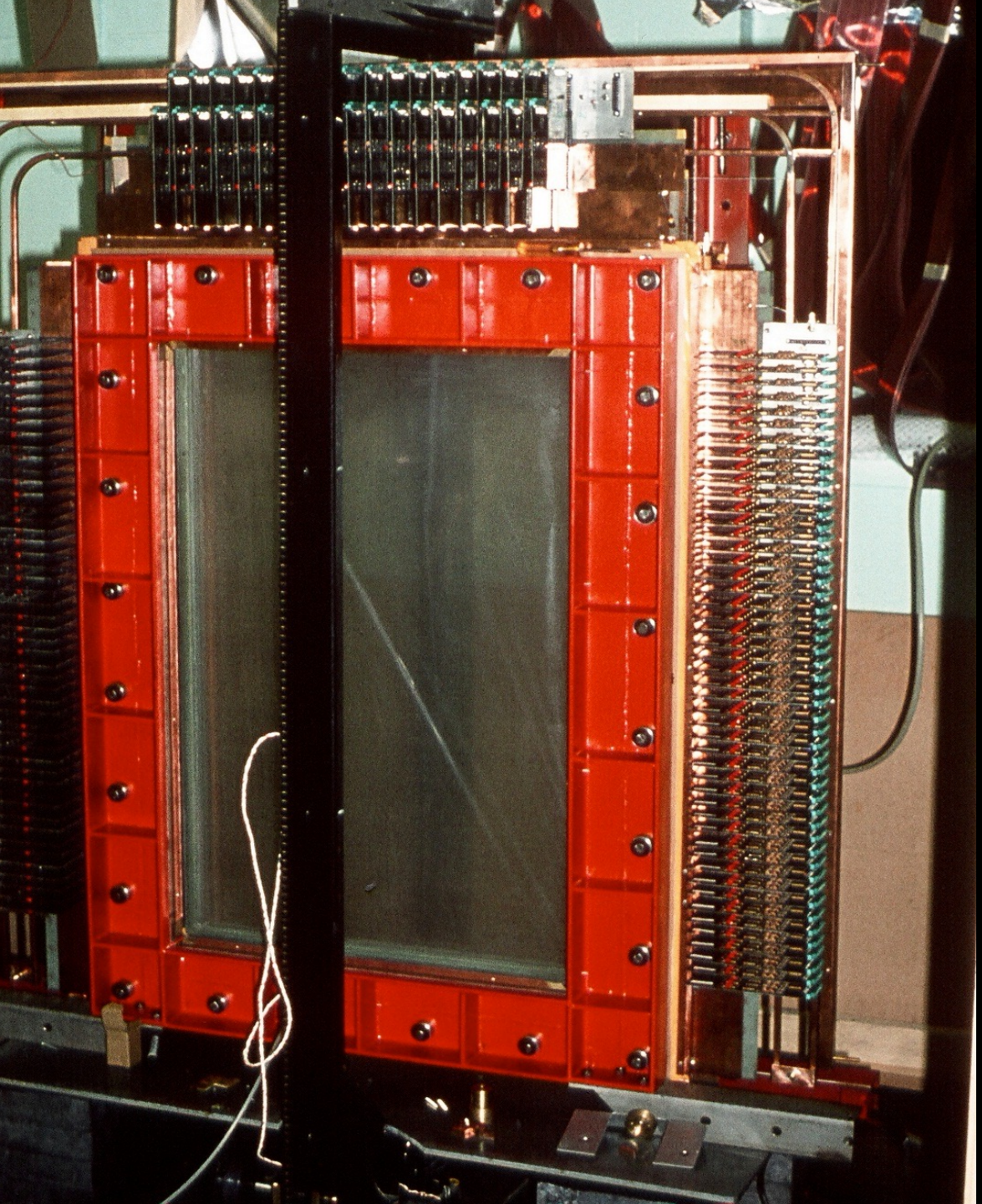
M_0, M_1, and M_2 are dipole magnets; A_0, A, B, and C are 8 proportional chambers; a and b are hodoscopes; S designates lead-glass and shower counters; C_B, C_0, and C_e are gas Cerenkov counters. Detector designed to follow the first DESY experiment

Measuring coordinates



1. There are 20 MHz passing through A_0, A, B, and C.
2. To sort out multi-tracks: planes are 60° apart!





Precision Detector

Developed by

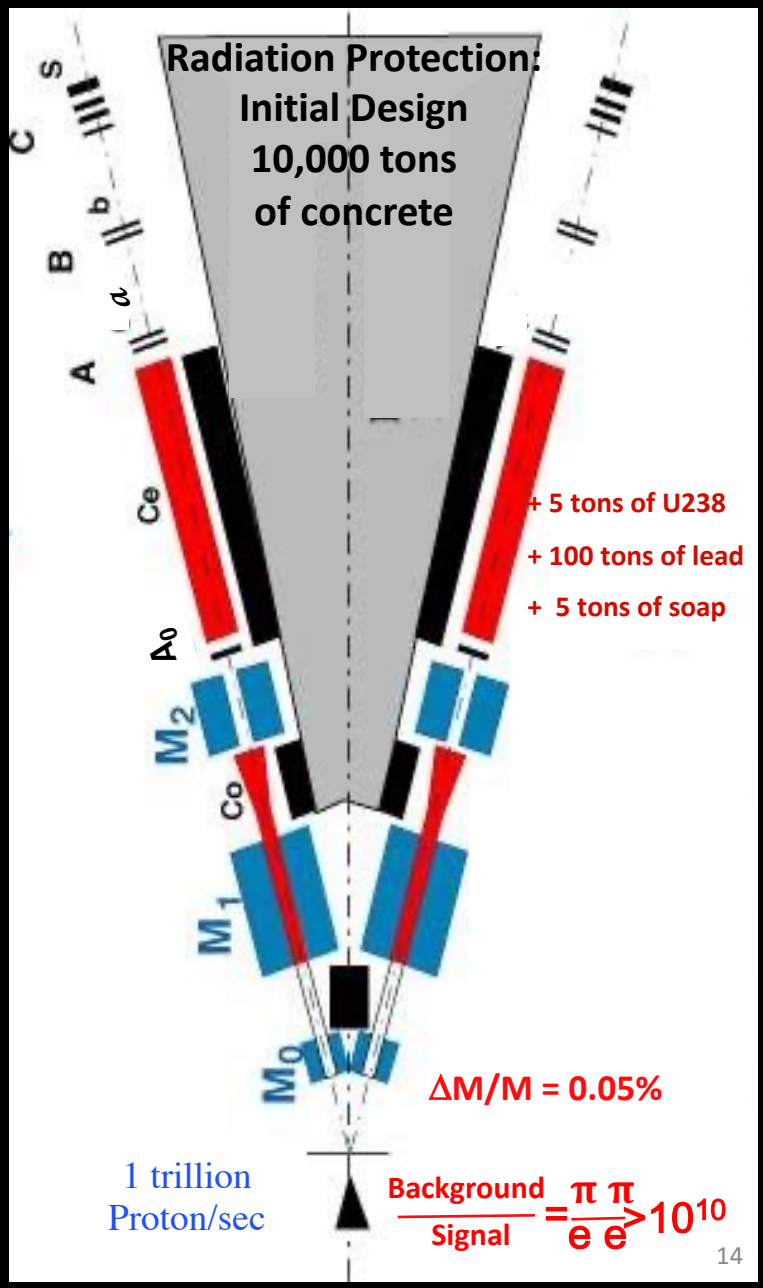
Prof. U.J. Becker

Exhibited at the

Smithsonian

Institution

Shielding arrangement



First data showing an unexpected peak at 3.1 GeV