EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

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PROPOSAL

PRECISE MEASUREMENT OF THE PROTON-ANTIPROTON TOTAL CROSS-SECTION AT THE CERN ISR

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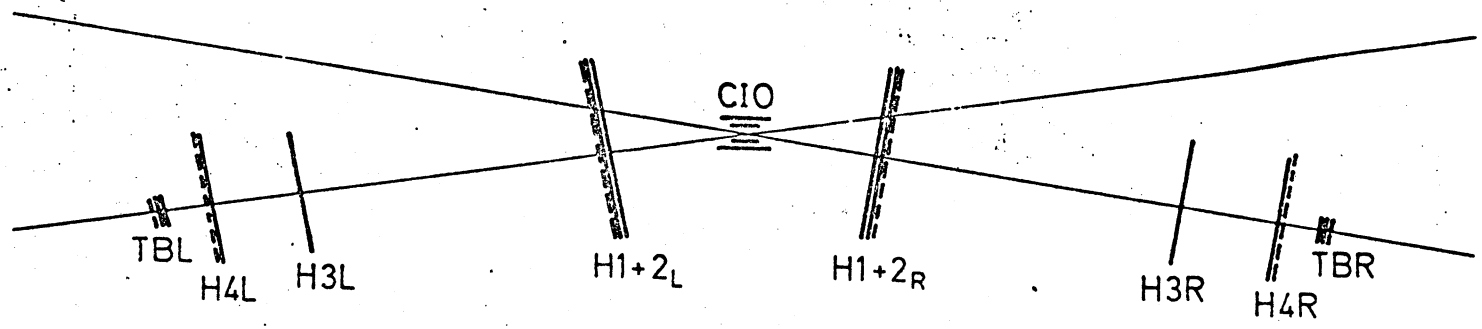
It is proposed to measure the antiproton-proton total cross-section at the five ISR energies, $\sqrt{s}$ = 23.5 GeV to $\sqrt{s}$ = 62.7 GeV. The expected precision ($\frac{\Delta\sigma}{\sigma}$ < 1%) will be sufficient to measure the expected increase of $\sigma(\bar{p}p)$ (1.5 mb) over this energy range and the difference $\sigma_{\bar{p}p} - \sigma_{pp}$ (2.0 to 0.6 mb).

In order to minimize the effects of experimental biases on the latter measurement, the proton-proton total cross-section will be measured with the same apparatus.

The method will be the same as that used to measure the proton total cross-section at the ISR by the Pisa-Stony Brook Collaboration (Experiment R 801) and much of the original equipment will be used. The ISR luminosity will be measured by the Van der Meer method. The addition of a drift chamber system (from expt. R 209) will help to reduce systematic errors on the total cross-section measurement and allow a more precise measurement of the topological cross-sections at multiplicity n, $\sigma^n(pp)$ and $\sigma^n(\bar{p}p)$, and of several correlation functions.

The detector is symmetric with respect to the interaction point and consists of scintillation counter hodoscopes H_1 - H_4, TB and CIO (see figure) and a central drift chamber detector consisting of 136 modules covering the full azimuth down to 7° with respect to each beam.



LEFT

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RIGHT