

NOVEL APPARATUS AND METHODS FOR PERFORMING REMOTELY CONTROLLED EXPERIMENTS AT CERN¹

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Recent atomic physics studies involving ultrarelativistic Pb ions required solid target positioners, scintillators, and a sophisticated data acquisition and control system placed in a remote location at the CERN Super Proton Synchrotron near Geneva, Switzerland. The apparatus, installed in a high-radiation zone underground, had to (i) function for months, (ii) automatically respond to failures such as power outages and particle-induced computer upsets, and (iii) communicate with the outside world via a telephone line. The heart of the apparatus developed was an Apple Macintosh-based CAMAC system that answered the telephone and interpreted and executed remote control commands that (i) sensed and set targets, (ii) controlled voltages and discriminator levels for scintillators, (iii) modified data acquisition hardware logic, (iv) reported control information, and (v) automatically synchronized data acquisition to the CERN spill cycle via a modem signal and transmitted experimental data to a remote computer. No problems were experienced using intercontinental telephone connections at 1200 baud. Our successful "virtual laboratory" approach that uses off-the-shelf electronics is generally adaptable to more conventional bench-type experiments.

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