are summarized in Table II. This new measurement of the QDDM bend angle is also in moderate agreement with the best value determined previously,[2] $130.4° \pm 0.4°$. The older number was determined using a completely different method, and the level of agreement found between the two numbers is encouraging. We expect the value of the QDDM bend angle to be somewhat sensitive to details of beam steering in BL5, an idea we plan to explore further in the future.

1. W.A. Franklin *et al.*, "A Complete Set of In-plane Spin-Transfer Coefficients for Small Angle pp Elastic Scattering at 200 MeV," contribution to this report.
2. S.W. Wissink *et al.*, IUCF Sci. and Tech. Rep., May 1989 – April 1990, p. 180.

TRAP TARGET STUDIES

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An elongated electromagnetic trap of a modified Malmberg-Penning variety is under development to test the feasibility of using trapped particles for a storage ring target. Electrons are used for this target prototype, although the eventual conversion to hadronic matter is envisioned. During 1995, the trap geometry was modified to improve the method of applying torque to the trap contents. The resulting electron plasma could be stably confined (up to three weeks on two occasions) using controlled background gas ionization to maintain a constant particle number of order 10^{10} particles.

In March and April, 1996, the filled trap was exposed to a cooled 45-MeV proton beam in the IUCF Cooler. The coasting beam was observed to heat the trapped plasma at a rate consistent with energy transfer through individual particle collisions, while the bunched beam was found to exhibit enhanced heating at a rate that could be varied by changing the length of the plasma column. A preliminary interpretation is that a harmonic of the proton orbit frequency was brought into resonance with one of the standing charge-density wave (Gould-Trivelpiece) modes. The interacting beam-plasma system was found to be stable up a beam current of 10^{15} particles/s, corresponding to a luminosity in excess of 10^{24} cm^{-2}s^{-1}, which is sufficient for application to atomic physics experiments.

An unexpected difficulty was encountered in these first beam tests. The passage of beam through the trap gradually deteriorated the electrostatic cylindrical symmetry that is needed to prevent radial growth of the plasma. Apparently the beam interacted with the background gas, leading to an irregular deposit of surface charge on the trap wall, which remained in place at room temperature for periods in excess of one hour. By heating the vacuum chamber, the trap recovered more quickly, allowing the tests reported above to be performed. The trap is being modified to remove stainless-steel surfaces exposed to the plasma, and to coat the copper wall with a thin gold coating to improve the surface conductivity.