A Concept for a New Type of Magnetic Septum Quadrupole, M. Marx, B.Parker, and H. Wuempelmann, DESY - It is proposed to cut away much of the iron from a standard quadrupole mirror plate, as found in a HERA QS-type interaction region quadrupole[1], so as to create an iron magnetic septum quadrupole with only minimal field distortion. Near the center of a quadrupole, unlike the region near the notch in a Lambertson-type dipole magnet, the B-field naturally goes to zero and thus problems of septum iron saturation should be able to be avoided through a careful choice of geometry. This expectation is born out in 2-D field calculations. It is found that having extra iron in the notch actually causes problems and mirror plate geometries with a small center septum gap actually give better results. For example configurations with a 1mm gap at the point of the notch exhibit very little field penetration (≈ few gauss) in the reduced field region outside the septum, even with ≈30 T/m quadrupole gradient inside the magnet. Possible applications such as interaction region luminosity increase, simplified optics matching for beam extraction and/or injection and forward angle particle detection of are discussed.

1 R. Brinkmann, DESY HERA 92-07 (1992) 26.