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FATIGUE OF MAIN RING QUADRUPOLE SUPPORT STRUCTURE

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The 7' Main Ring quadrupoles were built so that the upstream end rested very nearly directly over the floor stand while the downstream end had steel angles welded to it which projected 6' downstream to the floor stand. These angles are used for supporting the various correction elements mounted at each ministraight section. The quadrupoles were installed 4 years ago so that the upstream and downstream ends were at the same elevation to an accuracy of about 0.003", but we now find that the downstream end is systematically lower than the upstream end by 0.009". We assume this sag is due to fatigue in the weld joints between the quadrupole and the steel angles.

Since the magnets are alternately focussing and defocussing, this sag presumably cancels and has no effect on the beam. As the vertical alignment of the quads is being redone this sag is being removed. The figure shows a frequency distribution of the sag for 180 7' quadrupoles located at stations 13 thru 47 as measured by the Survey Group on March 23, 1976. The accuracy on each measurement of pitch is about 0.004".

Frequency distribution of Quadrupole Pitch