Ken Finkelstein

The G-Line Wiggler

Ken Finkelstein - *CHESS, Cornell University*

The 50-pole G-line wiggler is presently under construction at CHESS. Ken Finkelstein heads up this project and has been working closely with Hong Tet, who just received her Bachelors degree in Applied and Engineering Physics at Cornell.

As with our present wigglers, this insertion device is a hybrid magnetic structure; meaning the field comes from a combination of permanent magnets and high permeability magnetic iron. The new G-line wiggler incorporates a number of novel design elements. In particular, because the X-ray beam will be split between G-1 and G-2 or G-3 stations, the periodic magnetic field has been "squared-up" to produce a more gradual intensity fall-off with horizontal angle. To accomplished this, the pole is made thicker than the magnet (along the beam direction), but this tends to lower the peak field strength. Our solution to attain the fields that produce a 15 keV critical energy X-ray beam is to pack magnet material on 5 sides of each iron pole. This forces more magnetic flux into the gap maximizing the field where CESR electrons (and positrons) pass through the device.

Constraints on space in the CESR tunnel have motivated an increased level of sophistication in the wiggler support structure. The wiggler poles (50 pairs) are mounted on non-magnetic I-beams held in a cantilever "C- shaped structure" that supports and controls the wiggler gap (see Figure below). The cantilever must be strong enough to maintain magnet positions to a thousandth of an inch at the 4 cm gap where the force between poles exceeds 16,000 pounds. This wiggler will produce X-rays from e^+ and e^- beams for G and A-lines respectively.

The 3 meter long (50 pole) G-Line wiggler is pictured during the final stages of construction. The C shaped support frame is clearly visible as are 45 of the 50 magnet pole pairs.