

The TRIUMF experience with the design, fabrication, and commissioning of large gap wien filters

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In recent years TRIUMF has built two surface Muon (29.5 MeV/c) beam-lines each of which contained dual large gap Wien Filters. These were designed with the dual purpose of particle separation and simultaneous muon spin rotation up to 90 degrees (thereby creating a clean beam with variable transverse polarization). To achieve these functions achromatically (i.e. with essentially 100% transmission for a $\Delta p/p$ of 10%), a phase space inverting triplet separated the Wien filter pair.

The Wien filter specifications are similar for the two pairs: Operating E-field range ~5-45kV/cm, effective length ~1.5m, operating B-field range ~60-540G, with the difference between the two pairs reflected in their inter-electrode gap. The first device pair required a gap of 12cm and the second a gap of 8cm, thereby requiring the systems to be designed for +/-300 and +/-200kV respectively. Due to space considerations, the +/- 300kV system was designed with external power supply stacks + HV cables, whereas the +/-200kV system contained stacks internally integrated in the Wien filter.

To reliably commission these systems, many hard lessons were learned, with the most severe ones being revealed in the first +/-300kV system. Specific details on: i) Max e-field specifications; ii) power supply and cable issues; iii) feedthrough design; iv) triple point considerations; v) insulator design; vi) surface finish requirements; vii) conditioning and safety practices; and viii) cleanliness requirements will be discussed in the presentation.