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## **New design studies for TRIUMF's ARIEL High Resolution Spectrometer**

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As part of its new Advanced Rare Isotope Laboratory (ARIEL), TRIUMF is designing a novel High Resolution Spectrometer (HRS) to separate rare isotopes. The HRS has a 180 degree bend, separated into two 90 degree magnetic dipoles, bend radius 1.2m, with an electrostatic multipole corrector between them. Second order correction comes mainly from the dipole edge curvatures, but is intended to be fine-tuned with a sextupole component and a small octupole component in the multipole. This combination is expected to achieve the 1:20000 resolution for a 3 $\mu$ m (horizontal) by 6 $\mu$ m (vertical) emittance. A review of the design is presented including the study of limiting factors affecting separation, issues related to setup and beam tuning and maintaining beam stability over a reasonable experiment time frame. Simulation results are presented showing a design for the HRS dipole magnets that achieves both the radial and integral field flatness goals of  $<1 \cdot 10^{-5}$ . Field simulations from OPERA models of the dipole magnets are used in COSY INFINITY to find and optimize the transfer maps to 3rd order and study residual nonlinearities to 8th order.

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