Notes on Adjustment of Beam for ESR injection

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1. Results from Test run98 in August 2001.

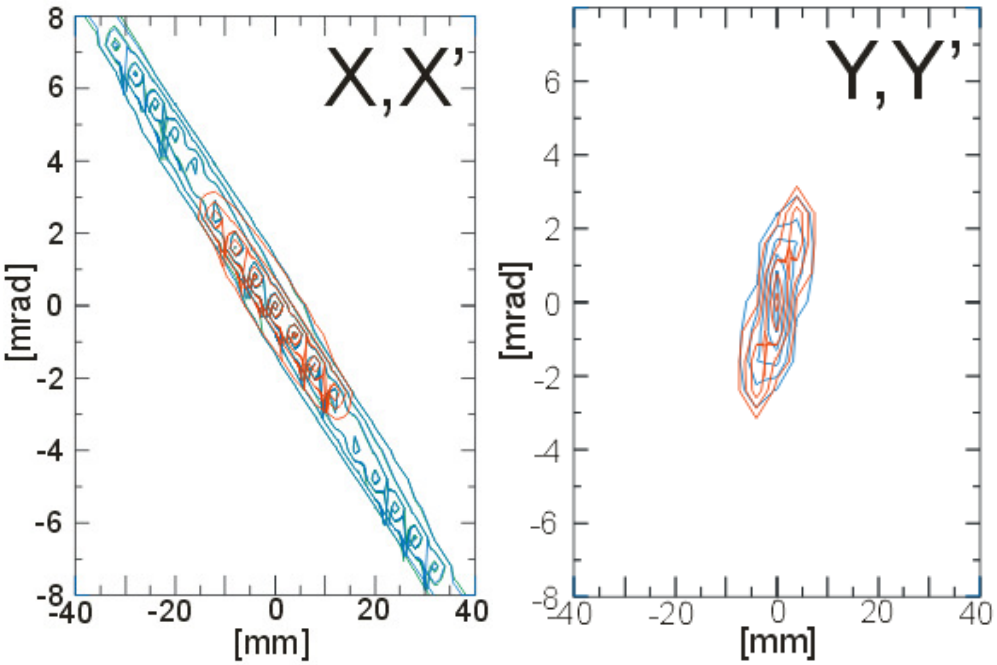

Figure 1: Phase space accepted and stored in ESR at take-over-point, 0.47m behind TE5QD22. Red measured ESR acceptance (H. Weick et al. RUN98) and blue/green calculated ESR acceptance by B. Schillinger and P. Spiller.

Beam parameters 0.47m behind TE5QD22:

Measured:
$\alpha_x = 5.76$, $\beta_x = 28.5$ m, $\varepsilon_x = 7.5$ mm mrad,
$\alpha_y = -2.63$, $\beta_y = 5.26$ m, $\varepsilon_y = 6.0$ mm mrad,

Schillinger thesis or Spiller report
$\alpha_x = 15.66$, $\beta_x = 68.45$ m, $\varepsilon_x = 20.0$ mm mrad,
$\alpha_y = -1.02$, $\beta_y = 2.34$ m, $\varepsilon_y = 7.0$ mm mrad,

→ Agreement but the ellipse is cut in x direction.

2.) Match Beam in Calculation

In calculation the 4 conditions for the beam must be matched and in addition one would like to have an achromatic image at S6 at the end of the FRS. This can be achieved by fitting the 5 last quadrupoles in front of the ESR. The polarity of the last duplet is first x-focusing and then y-focusing unlike proposed in Peter Spillers 1998 report. However, the calculations show no difference and the x then y focusing mode has become standard at GSI. Because of an error in the apertures of the last duplet the calculation was adjusted again in March 2005. The result is

the GICO input file frs-esr-matched-1.dat. The corresponding nodal set files is SISTSESR$_FRS-ESR-MATCHED-1.SET.

The following plots illustrate the FRS optics setting.

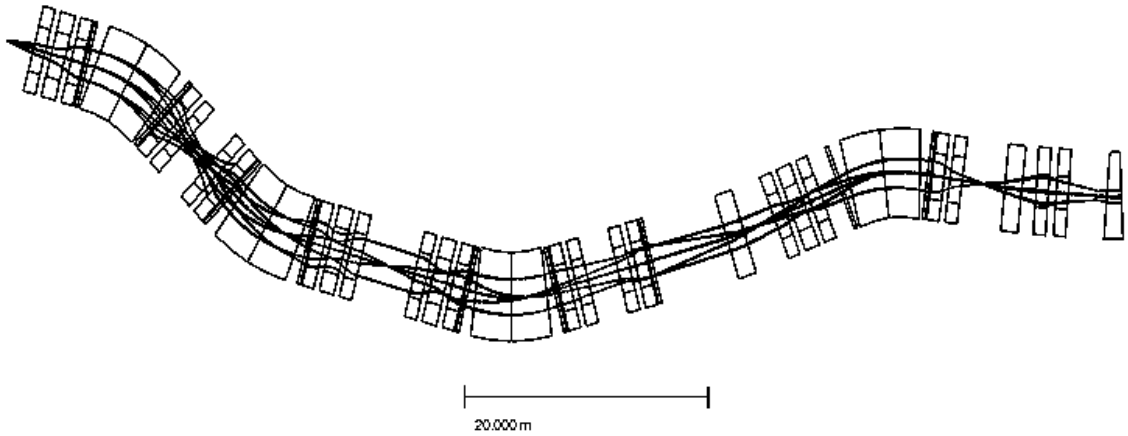

Fig.2: Top view of the FRS up to the ESR.

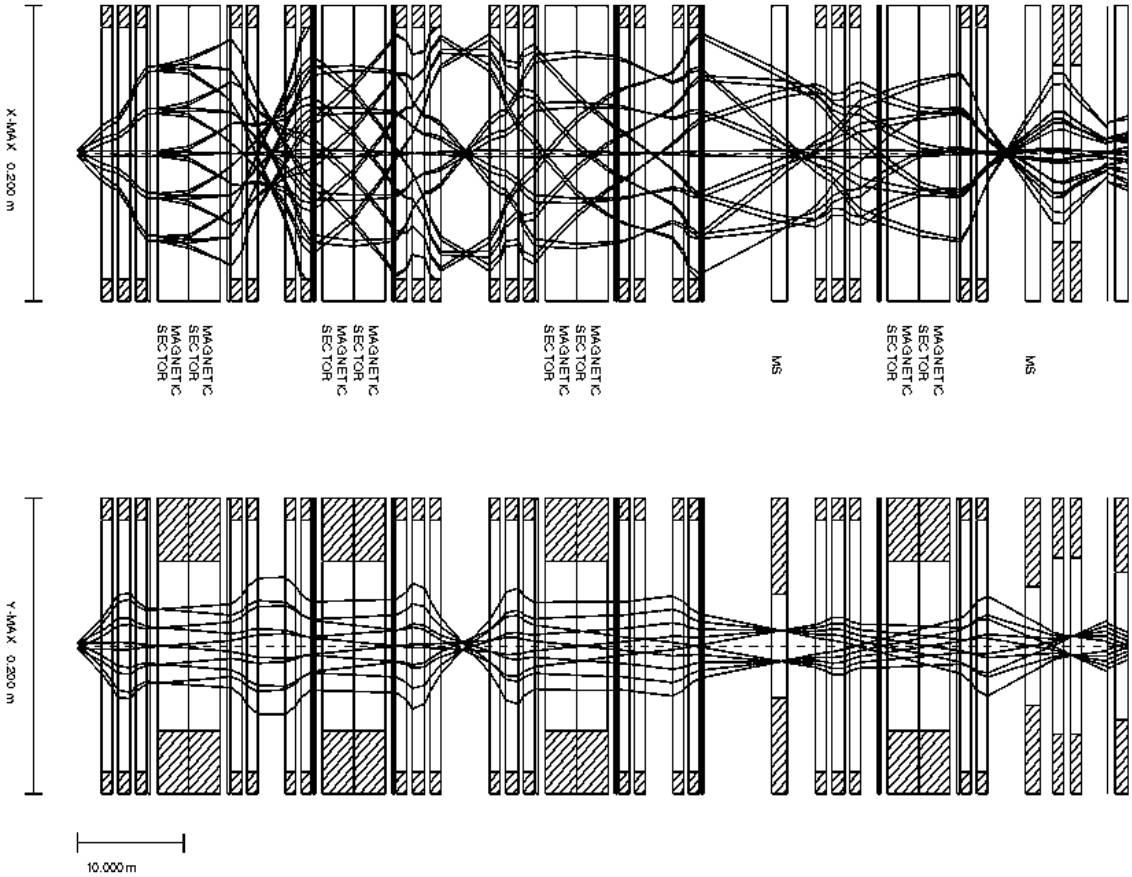

Fig. 3: Trajectories of a beam with initial spread 2.7 mm x 7.3 mrad in x and y and for three magnetic rigidities within ±1%.

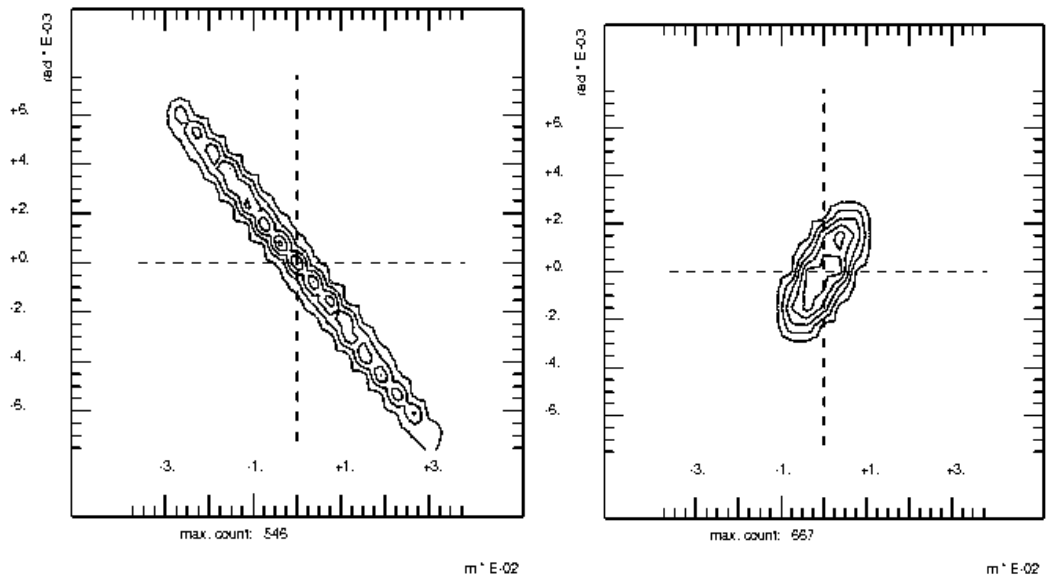

Fig.4: Phase space at the take-over-point. Left x,x', right y,y'.