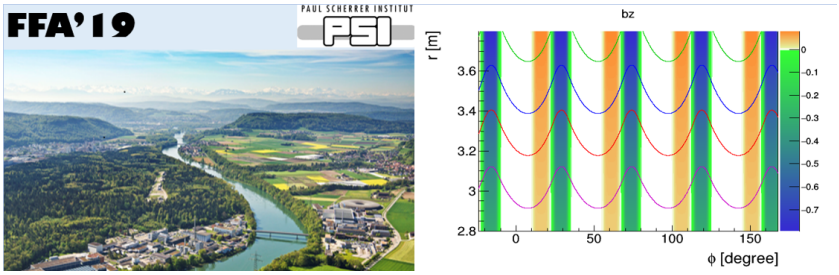

Contribution ID: **21** Type: **not specified**

The Vortex Effect in High-Intensity Cyclotrons and Isochronous FFA's

Thursday, 21 November 2019 16:45 (45 minutes)

We discuss the main factors that influence the space charge induced vortex motion of particles within high intensity bunches (Gordon 1969) in isochronous circular machines.
Firstly a phase slip due to deviations from strict isochronism determines if the bunches of a specific turn are above, below or at "transition", and hence whether stable vortex motion of the bunches is possible at all.
Secondly, at low energy, there are possible longitudinal and transverse effects of rf electric fields, the former depending on the bunch phase ("bunching" or "debunching"), the latter depending on the gradient of the accelerating voltage. Very high accelerating voltages in the first turns call the validity of adiabatic approximations and analytic methods into question.
While the influence of the rf acceleration is significant only at low beam energy, the phase slip has influences the stability of vortex motion up to beam extraction.

Primary author: BAUMGARTEN, Christian (PSI - Paul Scherrer Institut)

Presenter: BAUMGARTEN, Christian (PSI - Paul Scherrer Institut)

Session Classification: Beam Dynamics