Mechanical design experience

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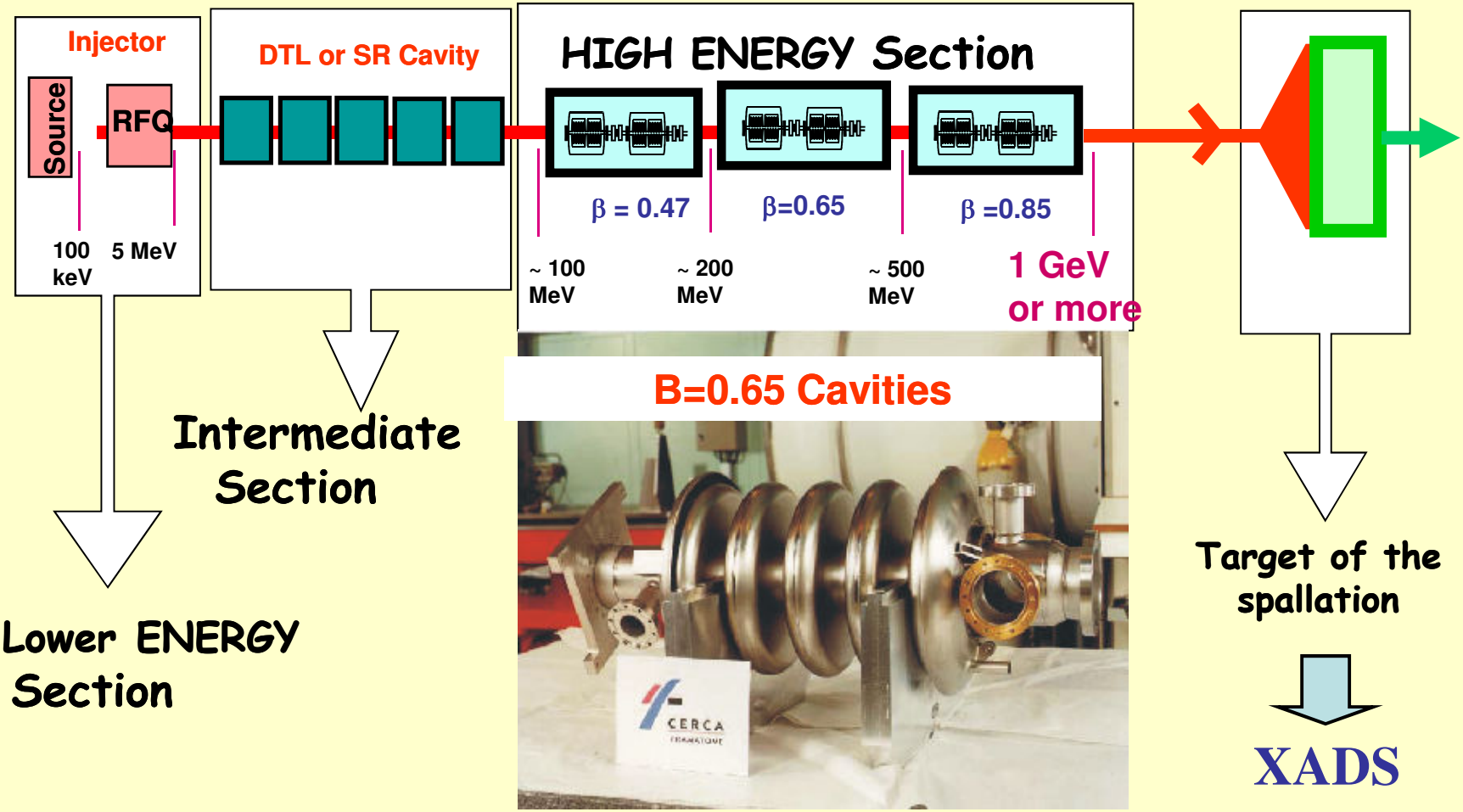
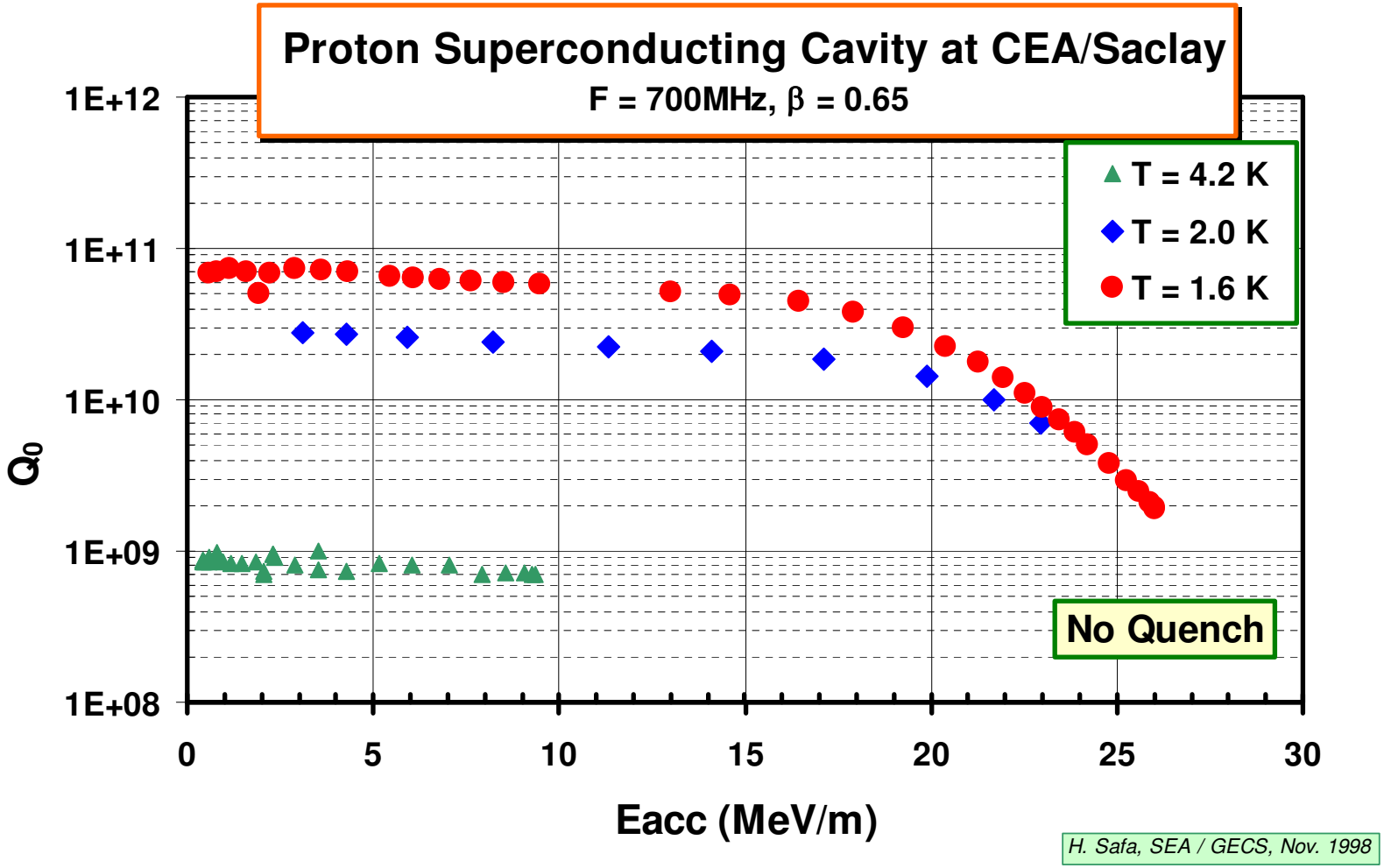
700 MHz CAVITY FOR PROTONS



Experience for XADS

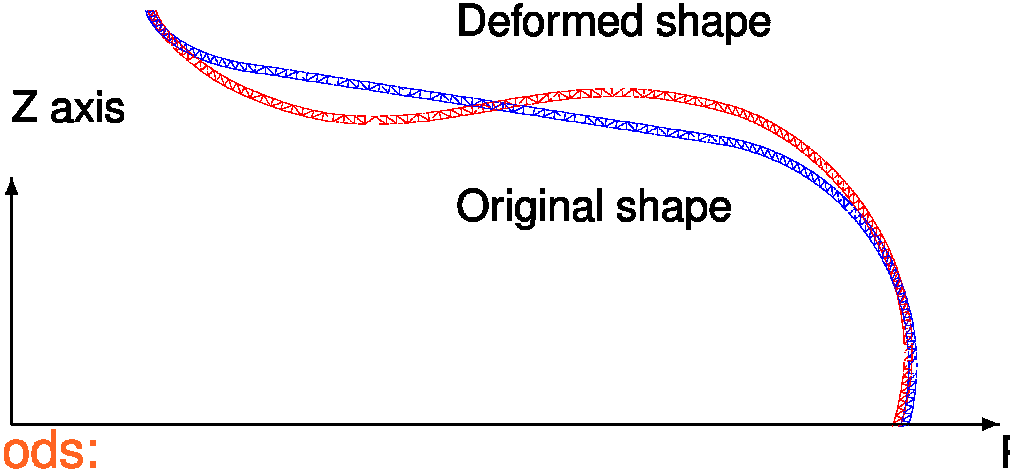


H. Safa, SEA / GECS, Nov. 1998

Simulations

1. INTRODUCTION

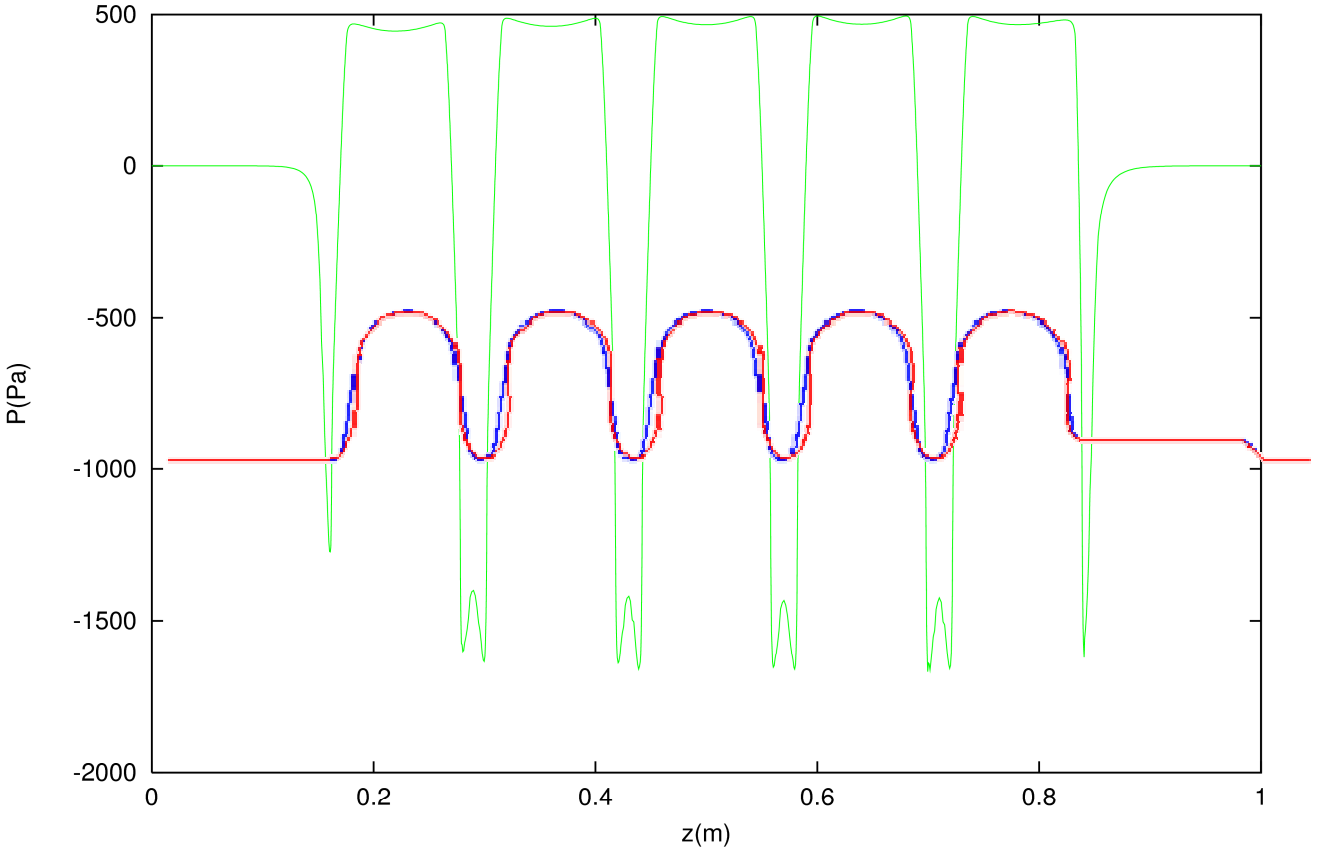
Objectives: frequecy pertubation due to Lorentz force



Methods:

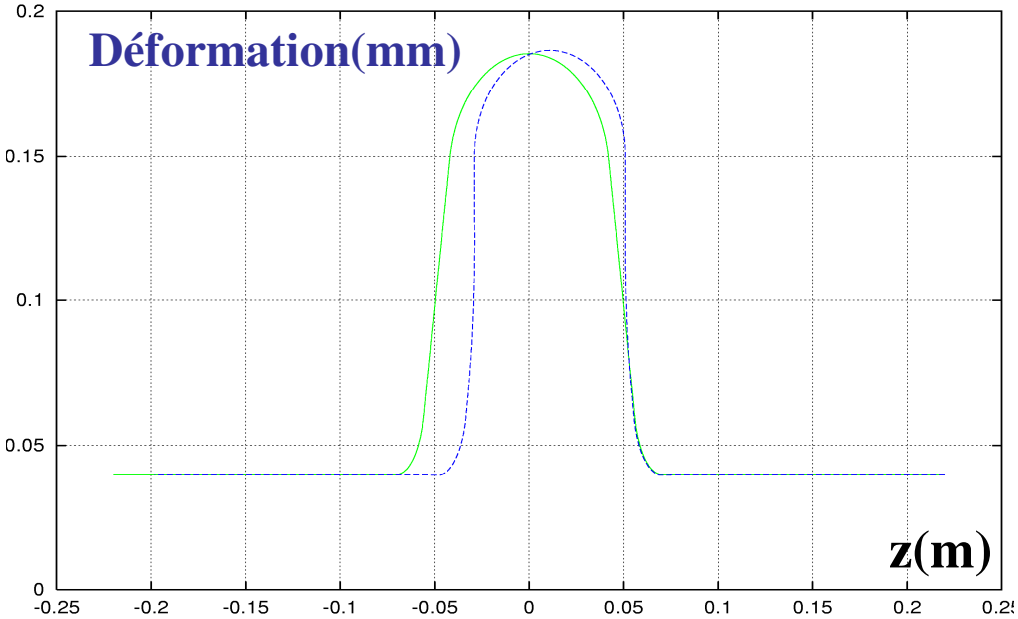
E, H field	Modeling	frequency shift
SUPERFISH	FEM code CAST3M	Slater's formula

Radiation pressure and cavity's deformation

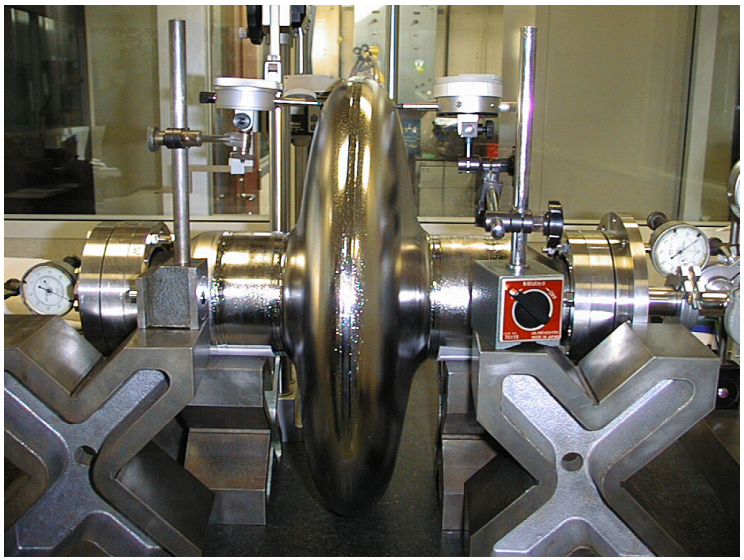


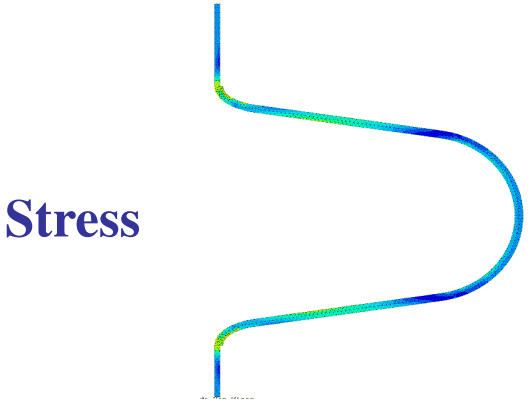
Thinckness optimization

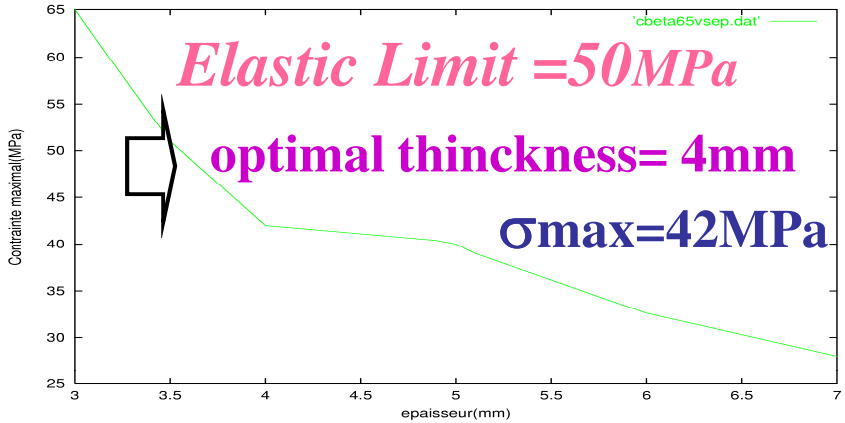
DEFORMATION UNDER 1 Bar



EXPERIENCE: CAVITY UNDER VACCUM







TUNER DESIGN PARAMETERS

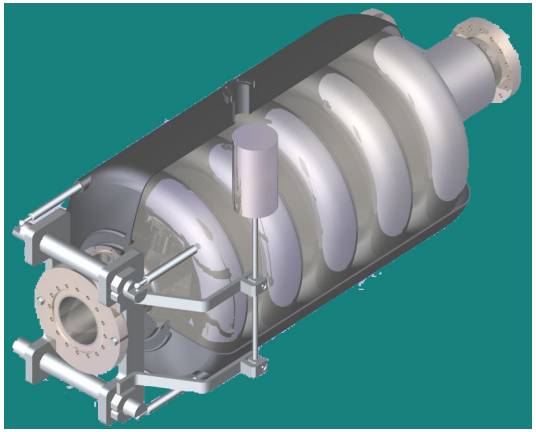
Computation --> ~ 220 kHz/mm
measured @ 300 K

Computation

$\frac{\partial f}{\partial l}$ (tuning sensitivity)	**250 kHz/mm**	$\Delta f_{Lorentz}$ (fixed)	**140 Hz**
$\frac{\partial F}{\partial l}$ (cavity stiffness)	**1590 N/mm**	$K_{Tank+CTS}$ (tank + CTS stiffness)	**20000N/mm**
Δf (bandwidth)	**~ 500 Hz**	Max. stroke	**2 mm**
Frequency resolution	**~ 25 Hz**	Mechanical resolution	**~ 100 nm**
$F_{Lorentz}$ (along z axis)	**13.86 N**	$\Delta f_{Lorentz}$ Total $\Delta f_{Lorentz}(total) = \frac{F_{Lorentz}}{K_{Tank+CTS}} \times \frac{\partial f}{\partial l} + \Delta f_{Lorentz}(bordfixe)$	**~ 313 Hz**

Computation

Computation



Values computed by H. GASSOT (CASTEM + SUPERFISH)

Measurements and simulations