The ThomX-Ray Source

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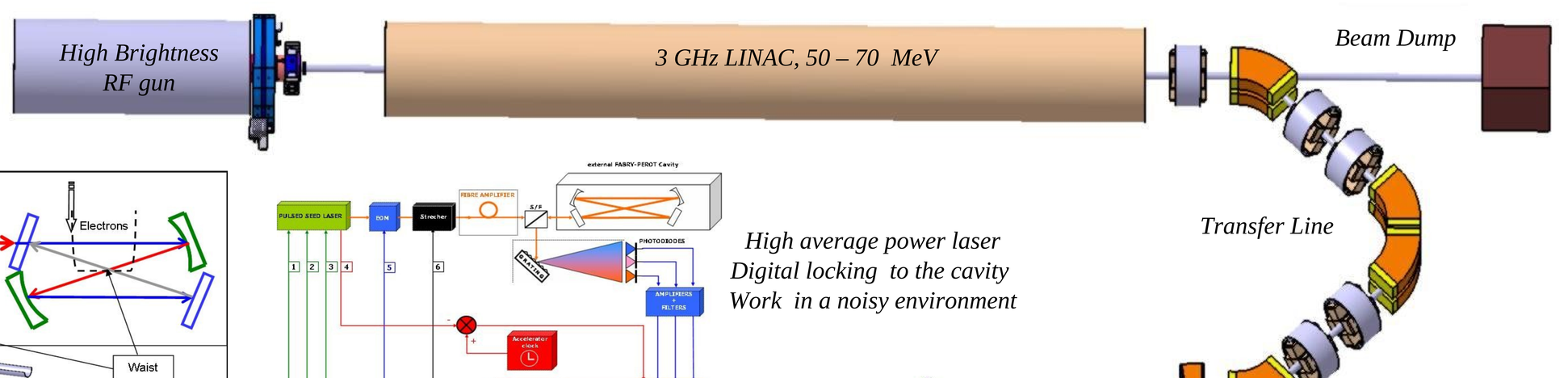
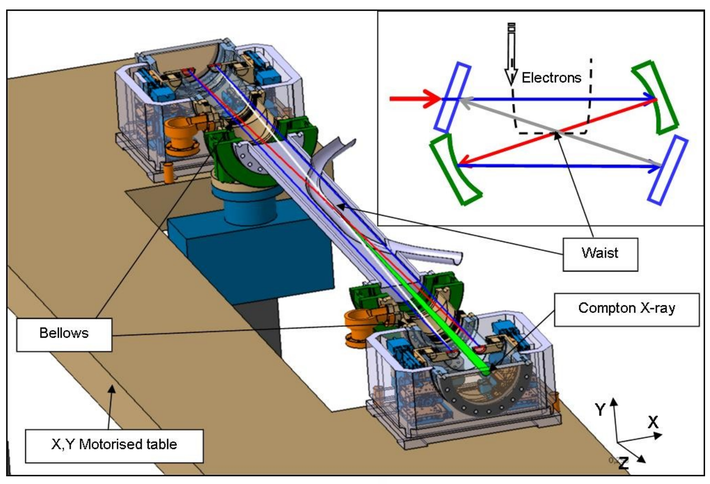




High average power laser
Digital locking to the cavity
Work in a noisy environment

Passive optical resonator - Fabry Perot cavity
High gain: 10^4
High reflectivity mirrors coatings
2D planar 4- mirrors configuration: assures for mechanical stability with small beam waist.

Fabry-Pérot laser cavity between dipoles
Offers the advantages :
Free the two long straights (space for the RF and the injection)
Mirrors located out of the ring (Access)
Compton extraction cone close to IP (Flux)

A COMPACT MACHINE. It can be integrated in a hospital, in a laboratory and in a Museum !!!!

Project Goal

Produce ~10^{13} ph/s in the 10-50 keV (upgradable to 80mkeV) rangeby Compton back scattering

Electrons and beam characteristics @ the IP

50 MeV Electron bunches injected @ 50 Hz, Q=1 nC, σ_τ= 20 ps, $\varepsilon_{x,z}$ = 5 10^{-8} m, $\sigma_{x,z}$= 70 µm rms

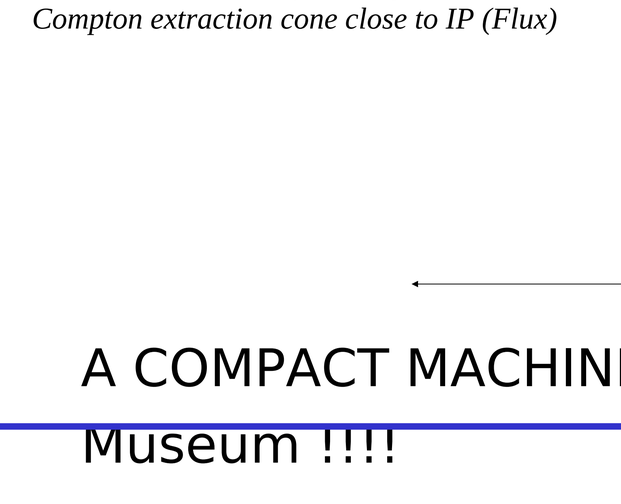
1.23 eV Laser pulse injected @ 40 MHz, in the cavity E=25 mJ/pul se, σ_τ = 5 ps, $\sigma_{x,z}$= 40 µm rms

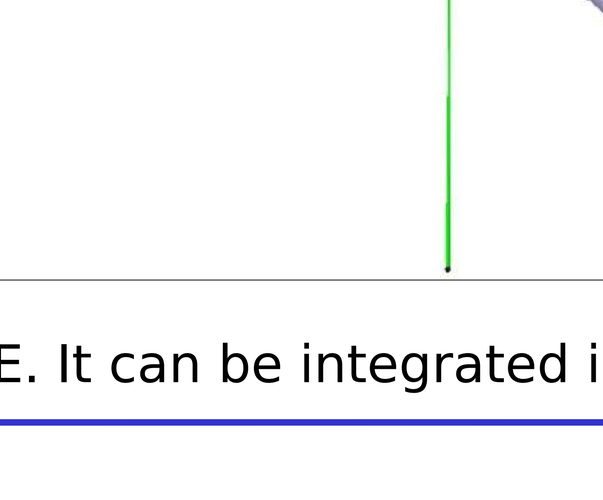
Machine

Linac + Compact Ring+ Optical FP cavity

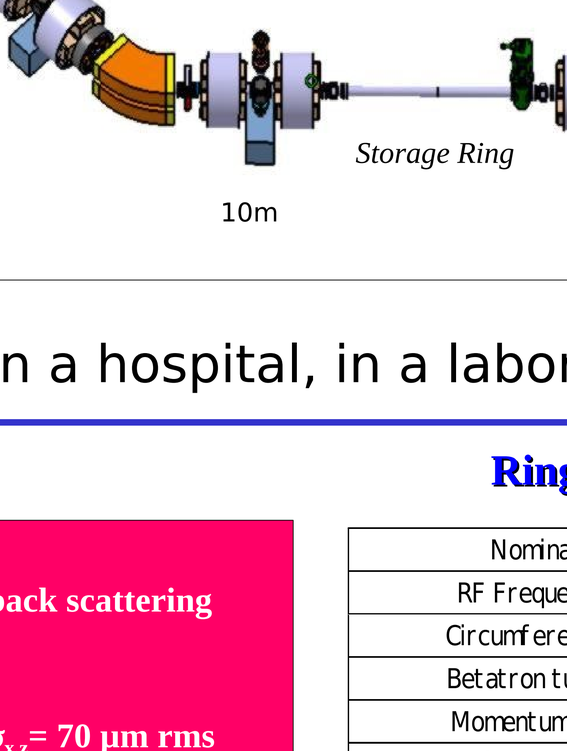
Ring Lattice

Nominal energy	50 MeV
RF Frequency / Harm	500 Mhz / 24
Circumference / Period	14.47 m / 21 MHz
Betatron tunes (ν_x , ν_z)	3.4, 1.4
Momentum compaction	1.48 10^{-2}
Natural chromaticities (ξ_x , ξ_z)	-3.2, -8.2
Beta, Disp @ IP	0.1, 0.1, 0
Nbr of dipoles/ Families / Field	8 / 1 / 0.5 T
Nbr of Quad / Families / Grad	24 / 6 / 3 T/m
Nbr of Sext / Families / Grad	12 / 2 / 30 T/m^2





Tunes chart



Beam Dynamics

To preserve the flux (50 MeV & 1nC) :

Max storage time : 20 ms
==> Due to CBS+IBS
==> to avoid strong RF cavity HOM

Min bunch length : 20 ps
==> To reduce collective effects