Status of the VEPP-2000 collider project at BINP.

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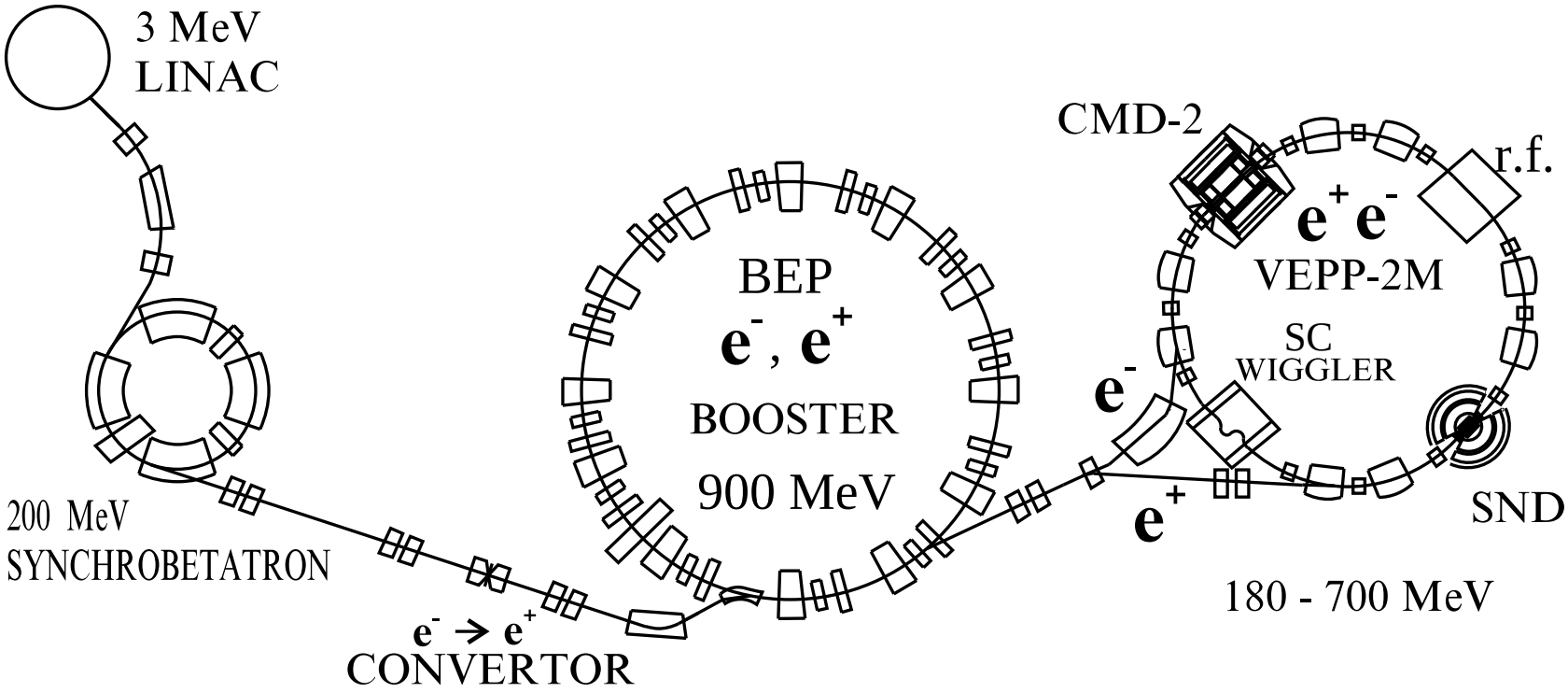
Layout of the VEPP-2M collider



Increasing the Luminosity

1. **Number of bunches**
2. **Bunch-by-bunch luminosity**

$$L = \frac{\pi\gamma^2\xi_y\xi_x\epsilon_x f}{r_e^2\beta_y^*}\cdot(1+\frac{\sigma_y}{\sigma_x})^2$$

Round beams:

- **Geometric factor**
- **Beam-beam limit enhancement**

Concept of round beams

Conservation of the angular momentum

$$M_z = yp_x - xp_y$$

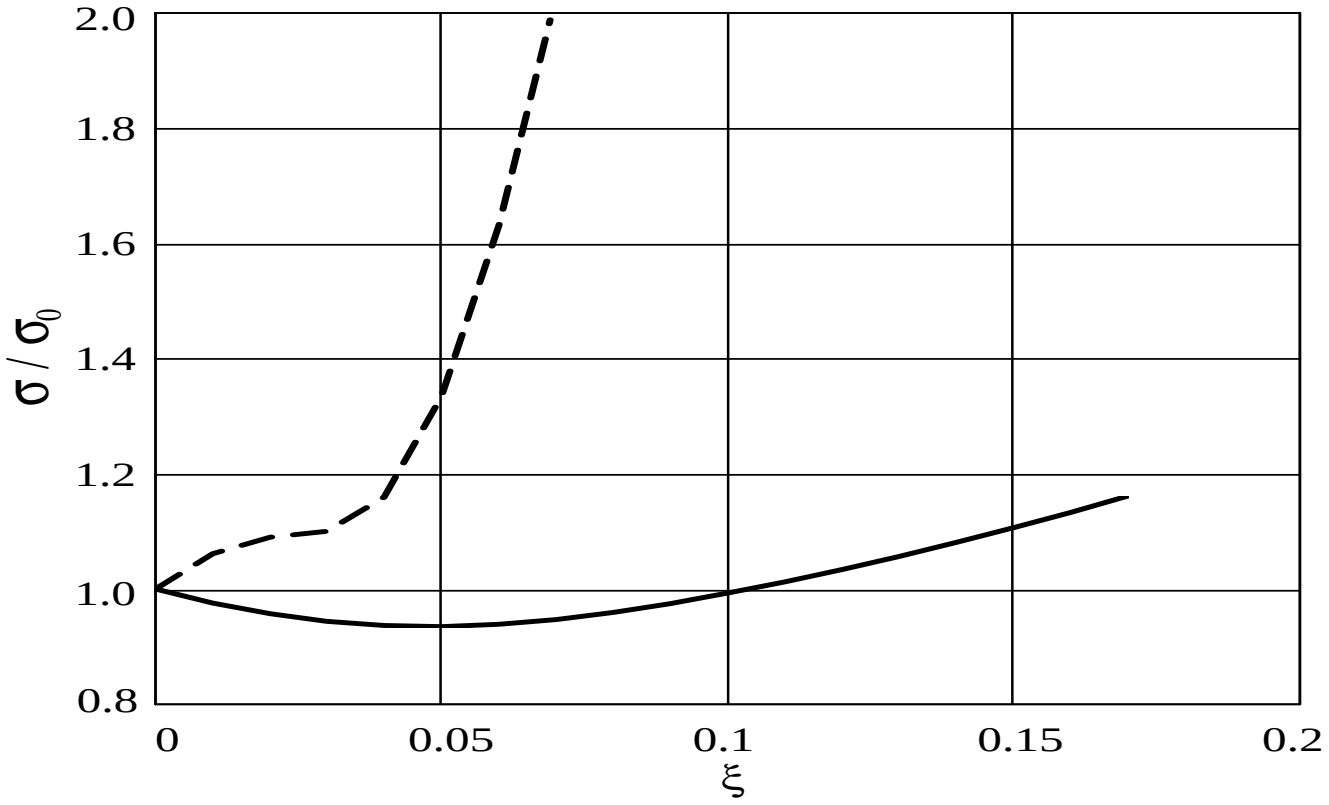
- **Round cross-section of beams at IP**
- **Machine optics has rotational symmetry**

$\longrightarrow$ **Motion in central field with additional integral of motion**

reduces the transverse oscillations from 2D to 1D!

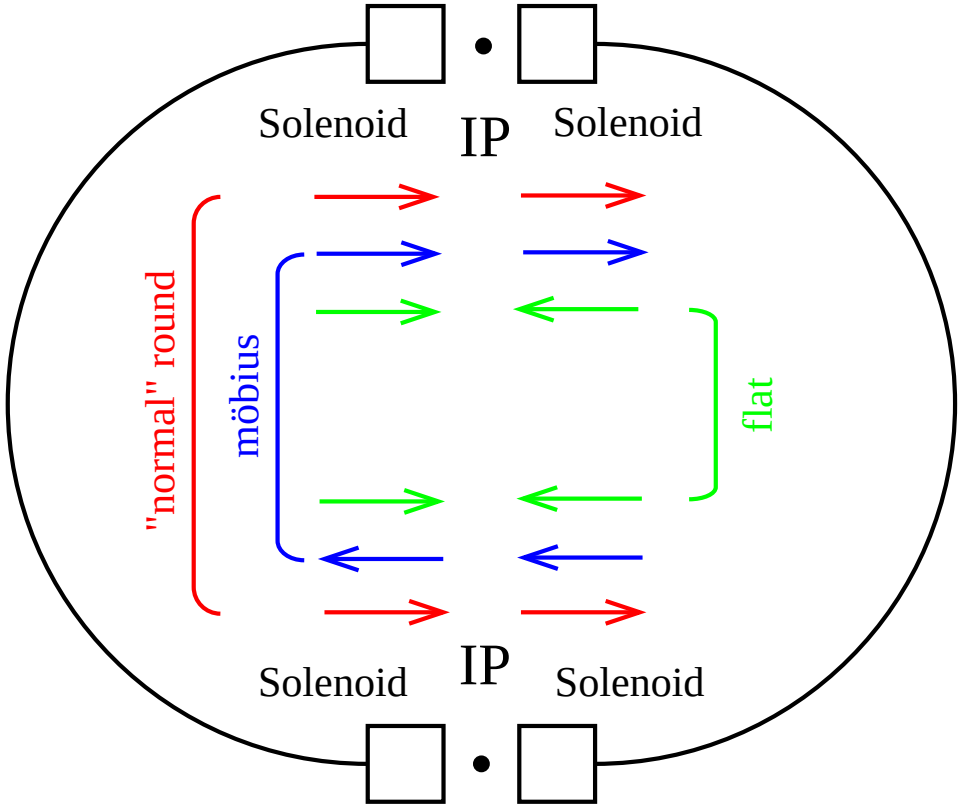
V.V.Danilov and E.A.Perevedentsev, Frascati Physics Series Vol. X (1998), p.321

Weak-strong simulation for VEPP-2M



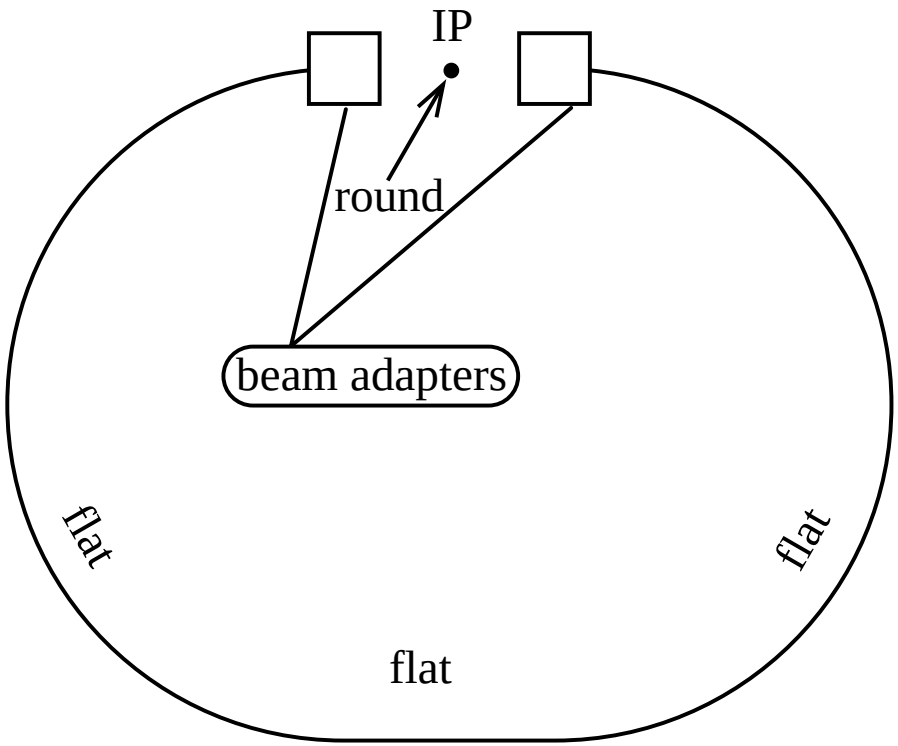
Vertical beam size vs. the beam-beam parameter. Solid line - round beam, dashed line - flat beam.

Practical realization: 1



Round beams at small machine

Practical realization: 2



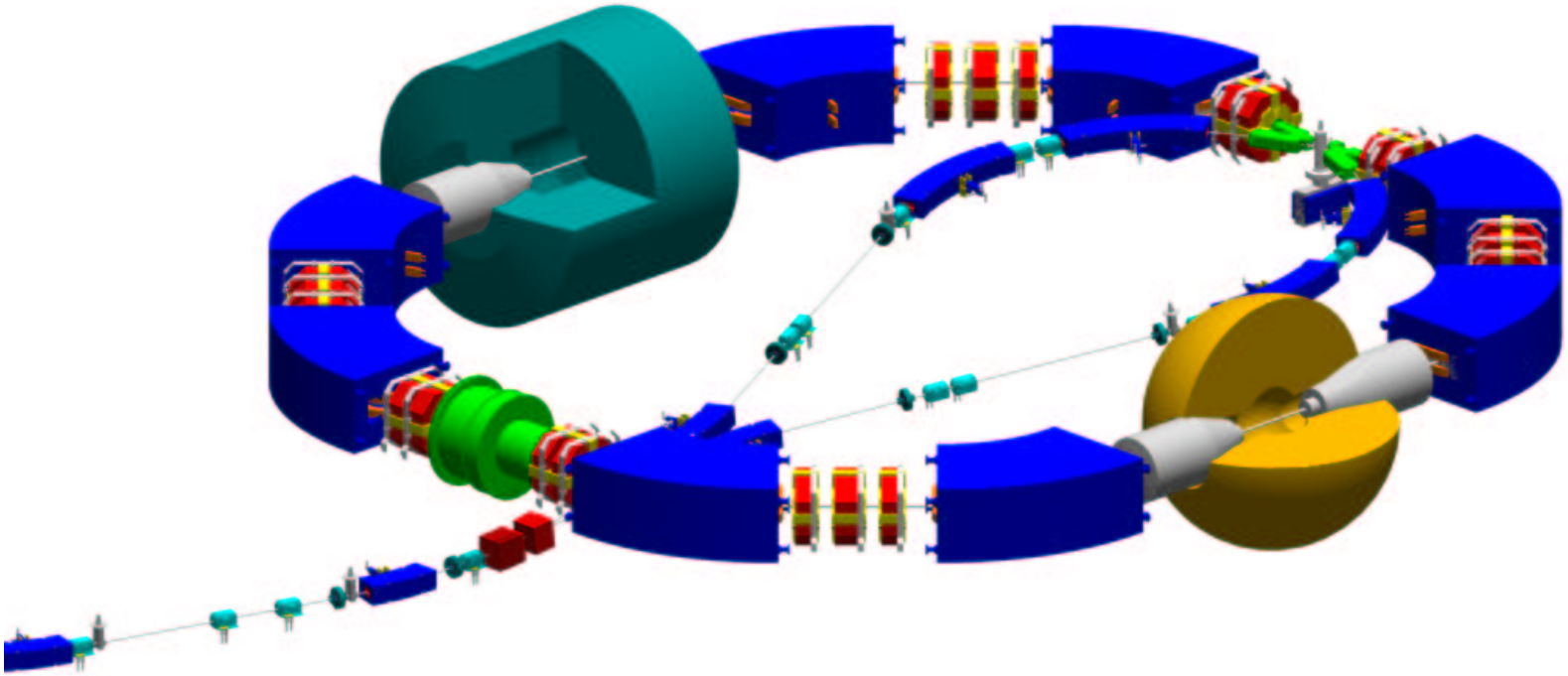
Conversion of conventional machine using beam adapters

A.Burov, S.Nagaitsev, Ya.Derbenev, FERMILAB-Pub-01/060-T

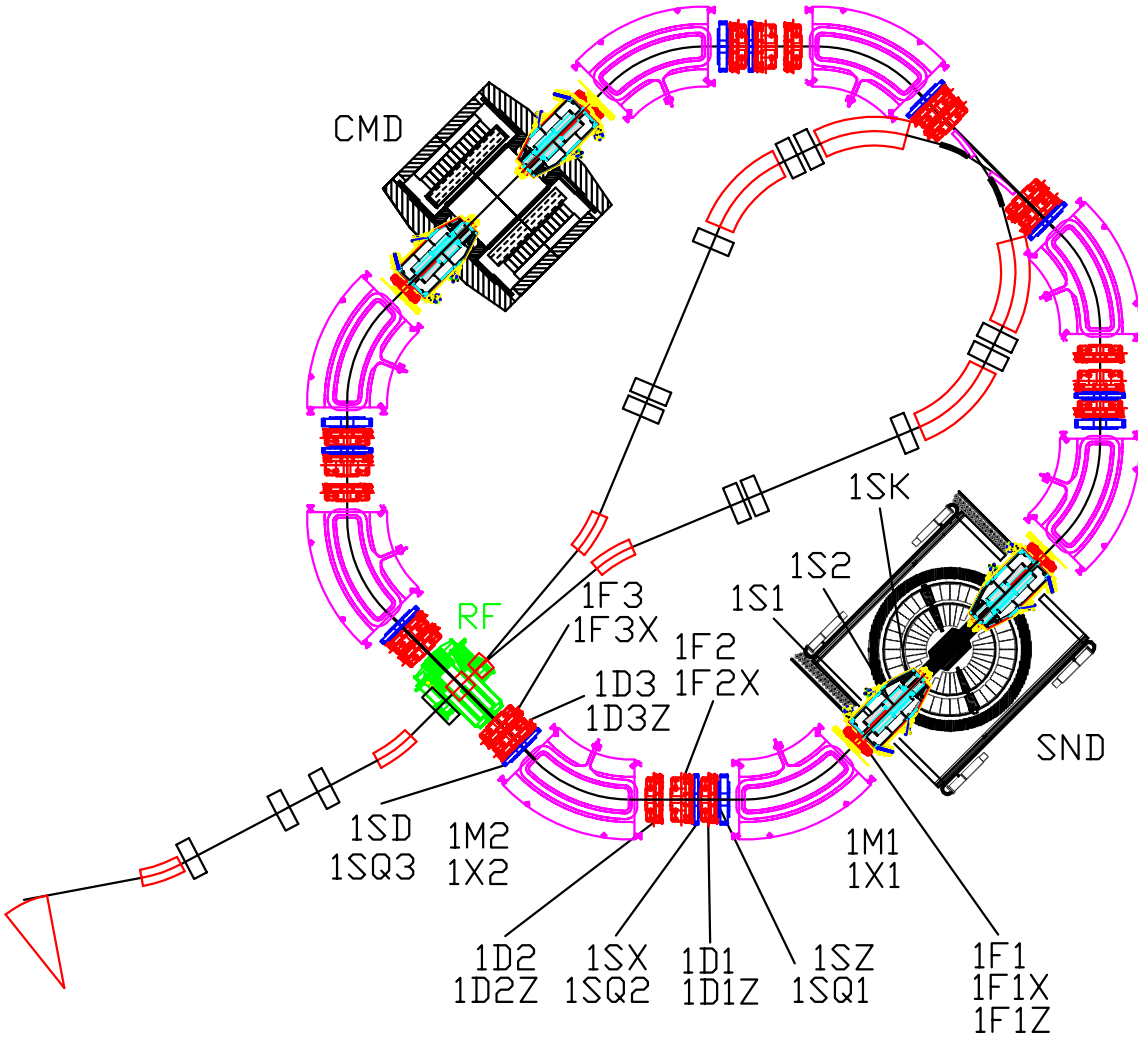
Main parameters of VEPP-2000 (at 900 MeV)

Circumference, m	Π	24.388
RF frequency, MHz	f_0	172.0
RF voltage, kV	V	100
RF harmonic	q	14
Momentum compaction	α	0.036
Synchrotron tune	Q_s	0.0025
Emittances, m $\cdot$ rad	ϵ_x ϵ_y	$2.2 \cdot 10^{-7}$ $2.2 \cdot 10^{-7}$
Energy loss per turn, keV	ΔE_0	41.5
Energy spread	σ_E	$6.4 \cdot 10^{-4}$
β at IP, cm	β^*	6.3
Betatron tunes	Q_x, Q_y	4.1, 2.1
Particles per bunch	e^-, e^+	$1.0 \cdot 10^{11}$
Number of bunches		1
Beam-beam tuneshifts	ξ_x, ξ_y	0.075, 0.075
Luminosity per IP, $\mathrm{cm}^{-2} \cdot \mathrm{s}^{-1}$	L_{max}	$1.0 \cdot 10^{32}$

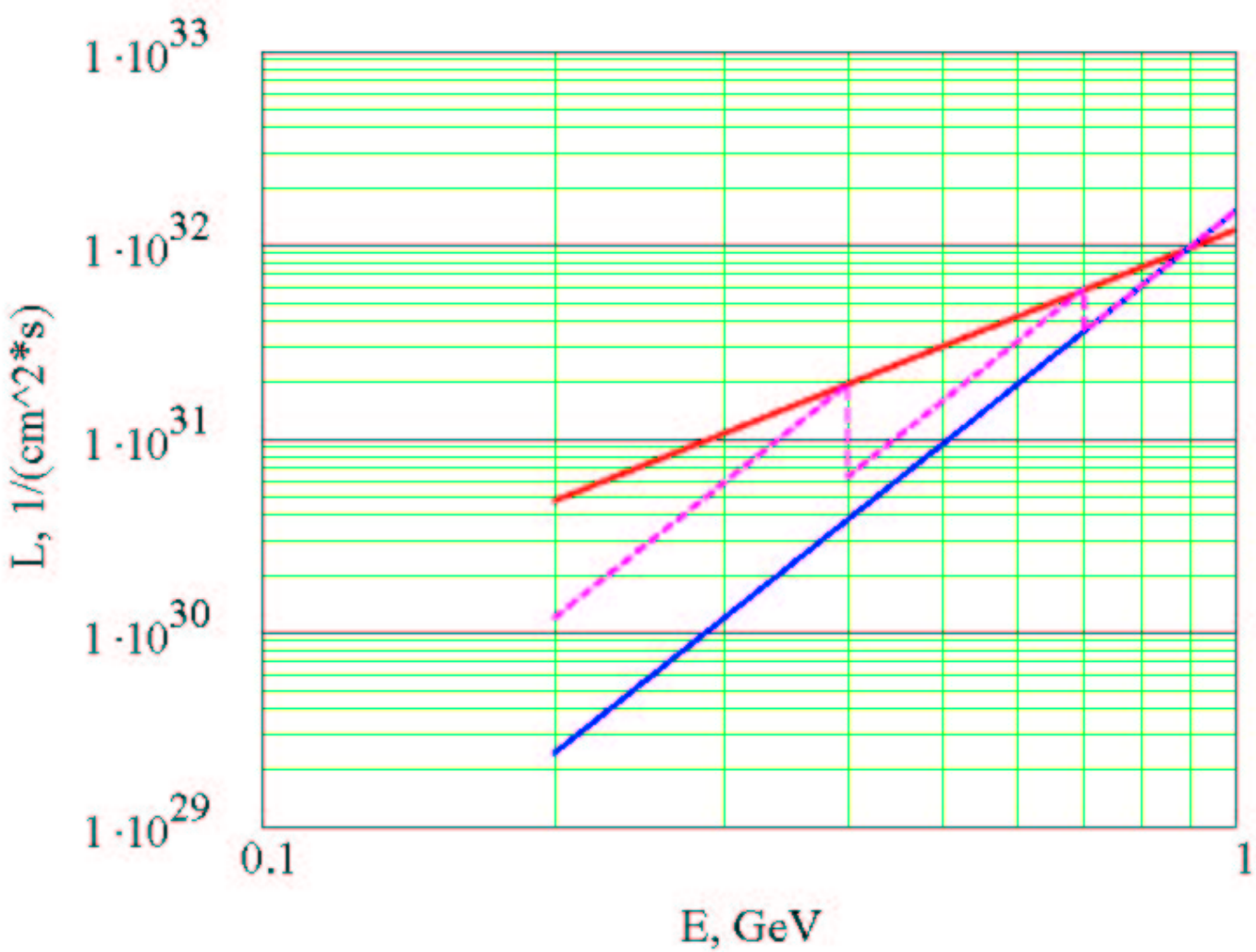
View of the VEPP-2000 collider



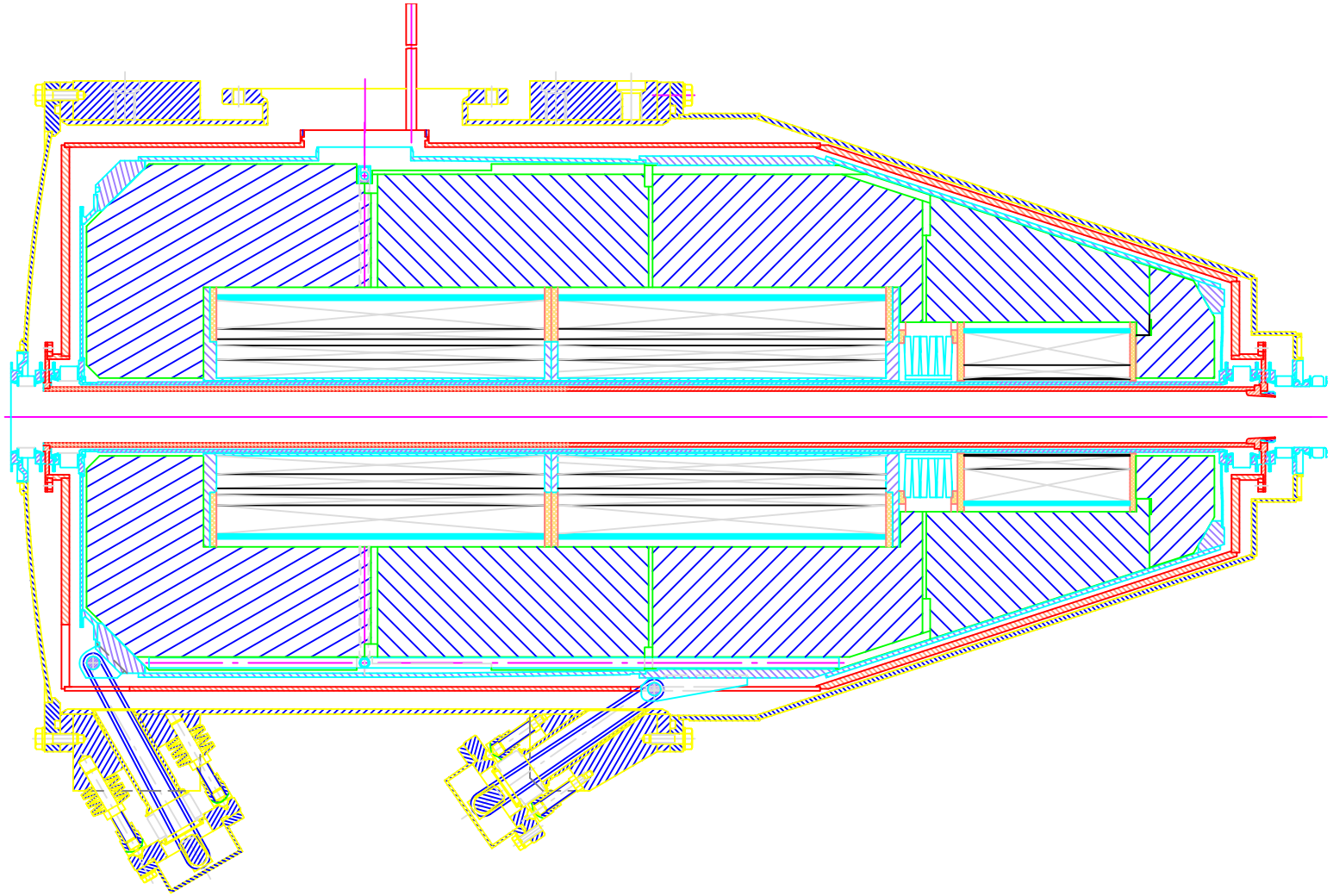
Layout of the VEPP-2000 storage ring



VEPP-2000 luminosity vs. beam energy



View of the VEPP-2000 solenoid



Current status of the VEPP-2000 construction

- **Optics elements ready.**
- **Vacuum chamber ready.**
- **Power supplies ready.**
- **SC solenoids in production (prototype tested).**
- **Cavity in production.**
- **Control system of the old VEPP-2M is being rebuilt.**
- **Assembly should be finished by June, 2003.**
- **First beam tests by the end of 2003.**