

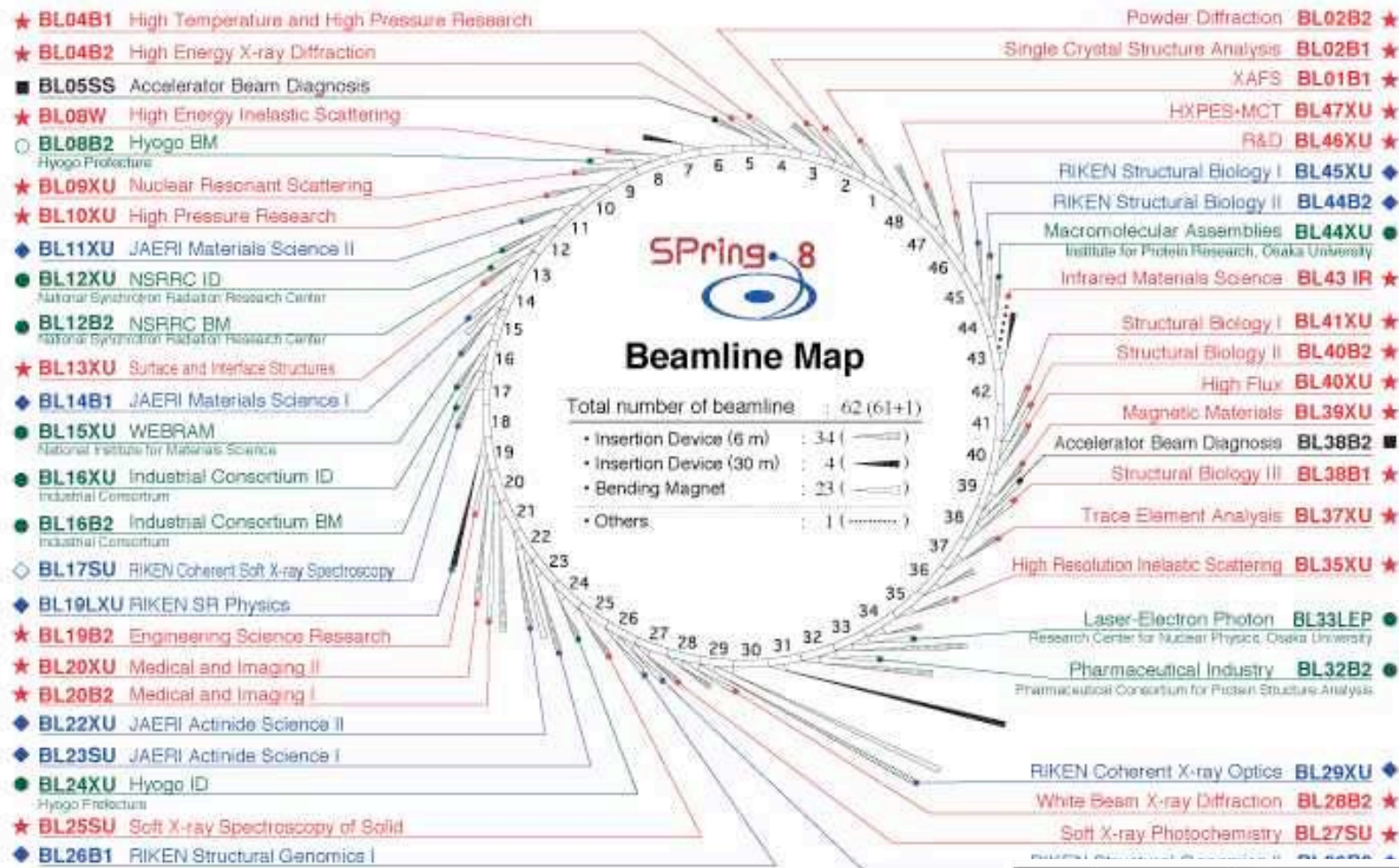
On new LEPS beamlines

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SPring-8

1. Present beamline status
2. Boundary conditions applicable to new LEPS BL
3. Possible configuration of new LEPS BL
4. Technical challenges

1. BL status: 14 Beam lines available (30m x3, 6m x8, Bending x3)



Present LEPS

BL: Beamline
 B1, B2: Bending Magnets
 XU: X-ray Undulator
 SU: Soft X-ray Undulator
 W: Wiggler

IF: Infrared Radiation
 LEP: Laser-Electron Photon
 LXU: Long-length Undulator
 SS: Straight Section

WEBRAM: Wide Energy range Beamline for Research in Advanced Materials
 NSRRC: National Synchrotron Radiation Research Center

★ Public Beamlines
 ● Contract Beamlines
 ◆ JAERI or RIKEN Beamlines
 ■ Accelerator beam diagnostic lines
 ☆ ○ ◇ □ : Planned or Under Construction

Status	Beamline				Total
	Public Beamlines	Contract Beamlines	JAERI or RIKEN Beamlines	Accelerator Beam Diagnostic Lines	
Operational	25	9	10	2	46
Planned or Under Construction	0	1	1	0	2
Total	25	10	11	2	48

2. Boundary conditions applicable to new LEPS BL

2-1. Electron beam conditions

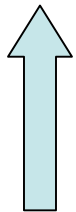
- Low vertical and horizontal emittance beam (3rd gen. light source)
- Good beam orbit stability ($3\mu\text{m}$ hor., $0.7\mu\text{m}$ vert.)
- Beam current of 0.1A at 8 GeV (higher at lower energies)
- Shortness of beam bunch length of 30 to 70 psec(FWHM)
- Purity of single bunch mode at 10^{-10}
- Arbitrary beam filling (bunch separation of 2nsec to $4.8\mu\text{sec}$)
- Constant beam current by top-up operation (full energy injection)

2-2. Uniqueness of the facility

- 4 long (30m) magnet free straight sections (3sections available)

2-3. Boundary

- Electron beam energy : 8 GeV or lower
- Beam current : 0.1A (possibility of 0.2A in future)
- Availability of beamlines
 - 30 m long straight section : 3 (BL30:1km long)
 - 6m long straight section : 8
 - bending magnet section : 3
- Minimum disturbance to light source users

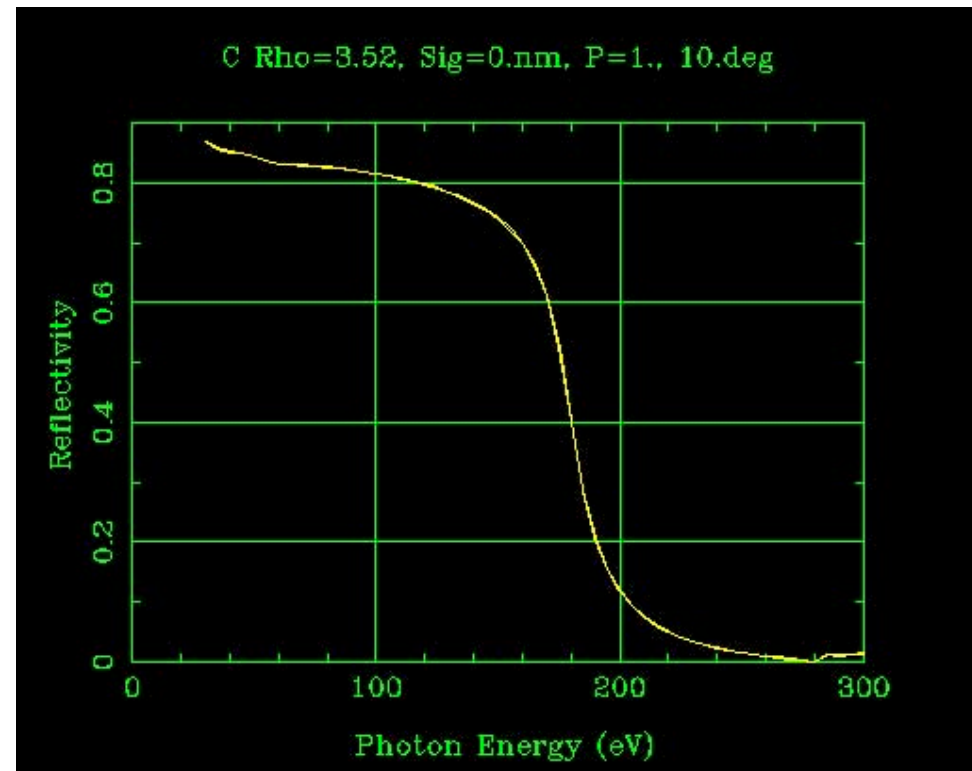
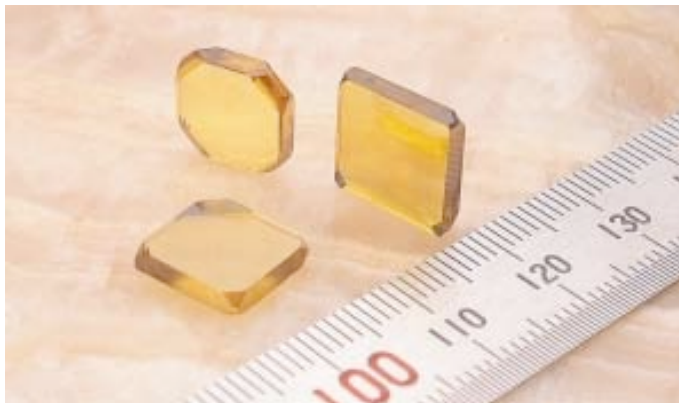


Consider minimum conditions for designing

3. Possible configuration of new LEPS BL

- Higher γ energies from 2.4 to ~ 8 GeV
 - (a) Soft-X ray source + backward Compton scattering
 - Undulator in storage ring @ ~ 100 eV + diamond crystal mirrors
 - + injection back to storage ring

~80% @ incident angle of 10 deg



(b) External compact accelerator + undulator

(c) Laser development with shorter wave length

- Higher γ intensity from 10^6 to $\geq 10^7$ /sec

- (a) optimize photon-electron overlap by “round beam” technology @30m long section

- (b) Higher power laser

- Experiment side

- (a) Extract beam to outside of SR building

- (b) Development of advanced detectors

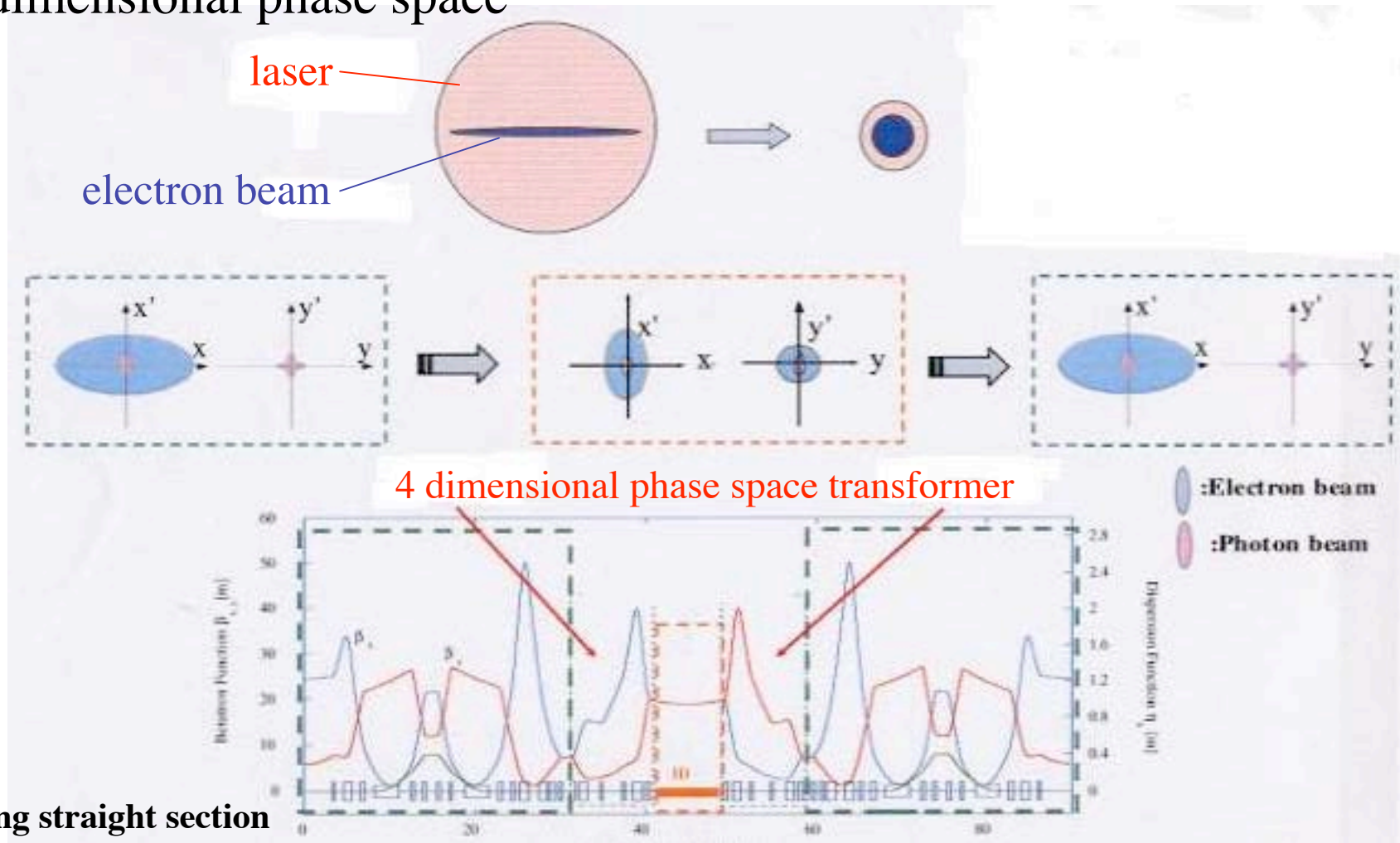
4. Technical challenges

- Round beam

skew quadrupole and solenoid magnets

transform sheet like beam to round shape by conserving

4 dimensional phase space



30m long straight section

- Optical elements under extremely high heat load in x-ray region