***Injection***

What is the present level of beam transient during injection? Is this acceptable?

Which injection schemes allow relaxing the requests on DA?
What are the best off-axis injection schemes? Is multiple injection kickers reliable?
What is the best Multipole?
What is the best location in the ring?
What is the expected level of residual perturbation (on orbit and beam size)?
Is a low emittance injector beneficial?

What are the best on-axis injection schemes?
Is a booster or a full energy linac a best option for ultra low emittance rings?
Can on axis injection satisfy the Top-Up current constancy?
What are the subsystem performance requirements for on axis injection? (kicker stability, rise time, flat top uniformity small emittance booster control location losses)
What is the maxim charge that can be swapped out (and thus the total current of the ring?)

Do tracking code need development?

What studies can be performed on existing rings to gain confidence towards building a low-emittance ring?

***--- Questions for Technology session (magnets)***

What are the apertures and the gradients required in ultra low emittance rings?
Can the magnet types and the high gradients required for low emittance rings be built in a practical way?
What are the main challenges in combined magnet design? (gradient dipoles, longitudinal tapered dipoles?)

Are SC magnets needed?
What mechanical tolerances are necessary on the design of the pole profile yoke and coils?
What are the alignment requirements? Stability requirements?
What are the relative merits of machined block vs separate elements on girders?

How can the field quality be optimized (codes)?
How can the field quality be achieved?
Are shimming and chamfer sufficient?
Are coil trims (or magic fingers) necessary also for such magnets?

Are permanent magnets a viable alternative to e.m. magnets?
Is R&D on material necessary (linearity of the yoke material)
Is lamination necessary or solid iron is sufficient?
What is the minimum pole gap clearance?
What is attenuation of AC magnetic field attenuation through the vessel?
What are the solutions for the yoke modification to let the photon beam through?
What is the required accuracy and repeatability for splitting the magnets?
What are the benefits of H cs C frame?
How to minimise power consumption?

Are there design solutions which are used to minimize the dimension of the magnets (e.g. coil overhang in densely packed rings)
Can R&D collaboration be fostered in this with similar magnet type design and construction?

Can magnetic measurements with high tolerances requirements and small apertures achieve the required resolution?

***--- Questions for Technology session (vacuum)***

What are the vacuum challenges of working with small diameters chambers (outer diameters 20-30 mm)?
Can the small aperture chambers be built in a practical way?
Is vacuum conductance a problem?

What are the solutions for better vacuum system design (very narrow cooper tube NEG coated)
Is NEG coating on vacuum chambers a sufficient solution?

Is in-situ activation possible/beneficial? What are the strategies?
Is NEG coating production capacity sufficient (long procurement time?)
Is more R&D required? Can R&D collaboration be fostered on good cheaper vacuum system?

Are there impedance issue with NEG coating?
What is the experience with impedance at light sources and ring using NEG?

What are the criteria for material selection (Al, Cu, SS)?
What are the criteria for wall thickness?

Are the pressure distribution modelisation codes sufficient? Is there any development needed?
Can collaboration be foreseen?

***--- Questions for Technology session (RF)***

Are there any RF system design issues?
How can the power consumption be minimized?

What RF frequency choice is optimal?
Are SS amplifiers taking over klystrons in most frequency ranges?

What are the best solutions for harmonic cavities (SC, NC, passive, active, …)
Would transient beam loading a limit with ultra low emittance lattice parameters??

What studies can be performed in existing rings?
What collaboration can be fostered?
What engineering R&D is required in view of the implementation in ultra-low emittance rings?

***--- Questions for Technology session (IDs and Wigglers)***

What undulator parameters are needed to best exploit diffraction-limited beam emittance (gap, period, phase error, etc.)
What is the limit of small gap in a SR? Is radiation damage the limiting factor? or impedance? or lifetime?
Can ID tolerances for ultra low emittance ring be met?
Are measurement techniques adequate to deliver the require resolution and characterise the field quality/
Is there anything to be gained by further design/manipulation of the electron beam optics?
What are the pros and cons of two canted undulator in a long straight wrt to two separate short straight sections?
Are there novel ID structures to be developed for unique applications?
Are there ID structures to be developed to reduce power on optics?

What are damping wiggler parameter requirements for 10-pm rings?
Can transverse gradient undulators be used for ring-based FELs?
Is there a role for fast-switching or pulsed RF undulators?

What performance can be expected from future superconducting IDs?
What are the main issues in damping wigglers and advance SCU?
Is the heat load in the cryostat understood? What are the experiments (colddiag, SSRF, …)?
Do they show similar patterns?
Can put absorber for upstream radiation in the vessels?
How is the cooling connected to the coil? Are absorbers interfering with cooling?
Is cold-warm measurement correlation good?
Is there agreement between design magnetic measurements and spectrum measured at the beamlines?

What studies can be performed on existing storage rings?
What R&D is needed before an actual USR is built?

***--- Questions for Technology session (Diagnostics)***

Is the present development of technology sufficient to guarantee stability within 10% of beam parameters for ultra-low emittance ring? (Diagnostics, girder vibrations, feedback systems, ground stability, slab construction)
What is the frequency range specified?
Is the present experience with low emittance V beam conclusive?
Is cooling vibrations an issue at higher frequency (200-400 Hz?)

Are diagnostics available to measure refined beam properties of ultra low emittancw lattices? (beam sizes, orbit data resolutions, turn by turn data, higher order lattice parameters, bunch length, coherence, …)
Should new ebpm desing be studies for small beam and short bunches?
Is there a trade off sensitivity vs impedance?
Do small aperture complicate the design?
What is the impact of button shape, insulator, dimension?
Should eBpm be stabilised on invar as well as some XBPMs
Are shielded bellows for small thermal drifts of the BPMs necessary?
Should BPM be placed close to every quadrupoles?
Or is it more important the source control (bending magnet included)?

Is resolution, current dependence, and latency in FOFB adequate for ultralow emittance rings?
Are mixed approaches fast/slow orbit feedback still an worth considering?
Is there any progress to be expected by more sophisticated approached in control theory (mode expansion, regularisation, …)

Can we use only XBPM to control the stability of the light source? To what extent?
Are the issues are with gap changes still the bottleneck of this development? For EPUs?
Can eBPM and XBPM in a feedback system? What is the status with this development?
Are there diagnostics in the beamline that can be coupled in the FOFB, practically?
Can trajectory vs gap errors be fully disentangled in an XBPM?

Is the present development of TMBF adequate for ultra low emittance rings?
Are higher gain, better ADCs and more sensitive pick ups needed?
TMBF with hybrid fill pattern should be developed?
Can algorithm for correction be improved?

What studies can be performed in existing rings?
What collaboration can be fostered?
What R&D is required in view of the implementation in ultra-low emittance rings?

***--- Questions for Technology session (Injection magnets and Kickers)***

What are the requirement on injector magnets and kickers in ultra low emittance rings? (stability, flat top, rise time, transverse field quality…)
What are the best results achieved?
What is the R&D required?

What are the best design solutions for MIK (quad, sext, nonlinear)?
What it the minimum vertical aperture allowed for such device?
What is the best position in the ring and wrt to the septum?
What are the sextupoles values required (for Sextupole injection kickers)
What are the mechanical tolerances required? alignment requirements? Stability requirements?

What are the residual transient oscillations ?
Is top up improved? What is the present experience?

What are the impedance issue of these devices?
Can R&D collaboration be fostered in this area?

***--- Questions for Technology session (Engineering)***

Ray-tracing dipole and ID radiation. Power densities, Material properties, Girder design, girder movers, vibration response, ground vibration, water flow vibration, magnet alignment and magnet measurement, stretched wire, vibrating wire, magnet adjustment, tolerance of alignment for low emittance, resonant gaps at flange joints, flange and joint technologies, tapers, pumping slots, crotch absorbers, ante-chambers, photon tube geometry, vessel expansion for bake-out/installation, corrector locations at SS or bellows locations

Building and services: Foundation engineering, temperature control, air conditioning, vibration background
Is dynamic girder alignment needed?
What are the limits in temperature control of the tunnel for ultra-low emittance rings? Is 0.25 C adequate?