# *Summary of the DR/BDS session of LCWS2024*

2024/07/11, The university of Tokyo
Toshiyuki OKUGI (KEK)
Angeles Faus-Golfe (IJClab)
Rogelio Tomas Garcia (CERN)
Andrzej Wolski (The University of Liverpool)

# Presentation List

**7/09**

11:00

**ATF2 status and operation 2023-2024** — *Alexander Aryshev*
*380, Science building n.1* — 11:00 - 11:15

**Wakefield study at ATF2 beamline** — *Dr Yuki Abe*
*380, Science building n.1* — 11:15 - 11:30

**KEK ATF Linac and Damping Ring klystrons High-Power RF field phase and amplitude stability study**
*Dr Konstantin Popov*

**Ultra-low Beta* experimental studies at ATF2 and future plans** — *Mr Andrii Pastushenko*
*380, Science building n.1* — 11:45 - 12:00

12:00

**ILC C-BPMs status and plans** — *Laura Karina Pedraza Motavita*
*380, Science building n.1* — 12:00 - 12:15

**7/10**

16:00

**State of the art in low-emittance storage rings and CLIC DR design** — *Yannis Papaphilippou*
*380, Science building n.1* — 16:00 - 16:15

**Present design of ILC DR** — *Kiyoshi Kubo*
*380, Science building n.1* — 16:15 - 16:30

**Present design of ILC BDS** — *Toshiyuki Okugi*
*380, Science building n.1* — 16:30 - 16:45

**Status and plans of CLIC BDS** — *Enrico Manosperti*
*380, Science building n.1* — 16:45 - 17:00

17:00

**ATF2 incoherent Cherenkov radiation monitor status and plans** — *Kacper Lasocha*
*380, Science building n.1* — 17:00 - 17:15

**ATF2 BPMs status and plans** — *Alexey Lyapin*
*380, Science building n.1* — 17:15 - 17:30

*2 for CLIC design*

*2 for ILC design*

*6 for ATF study*

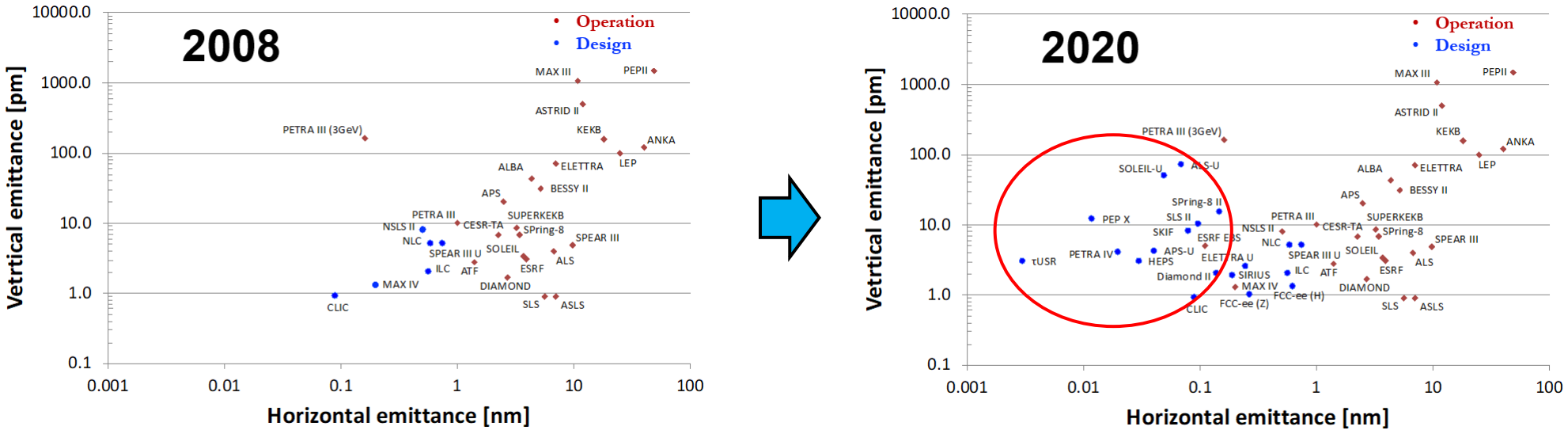
*1 for ILC beam instrumentation*

# *State of the art in low-emittance storage rings and CLIC DR design*

*Yannis Papaphilippou (CERN)*

- **High-bunch brightness** in all three dimensions
- **Repetition rate** and **bunch structure**
- **Injection** (Dynamic aperture) and **extraction** (emittance stability)

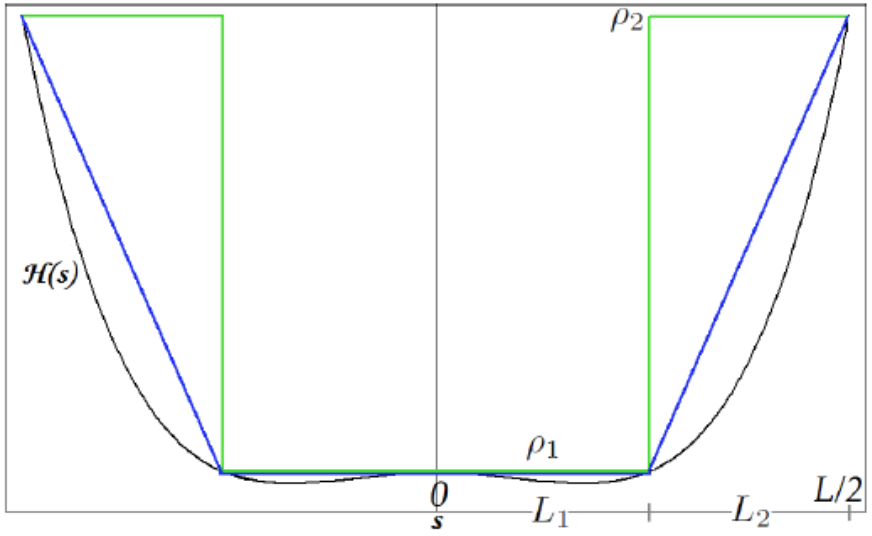
## *Emittance targets*



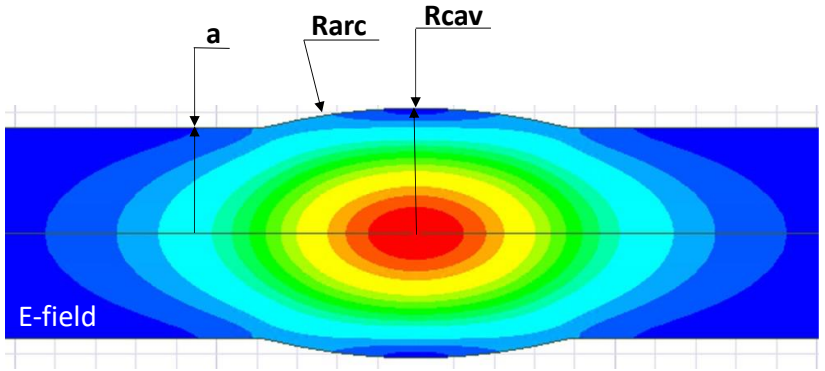
# *Improving CLIC DR design*

- *New **DR arc cell (longitudinally varying bends)** and **SC wigglers** for circumference reduction (collective effects)*
- ***RF frequency choice** and **LLRF** technical development (power reduction)*
- ***Prototypes for stripline kicker + pulser** have been realized and tested.*
- ***Prototypes for SC wiggler tests , varying permanent bending fields,** have been realized and tested.*

## *Longitudinally variable bends*




## *DR cavity for ultra-low R/Q of 14.3Ω*

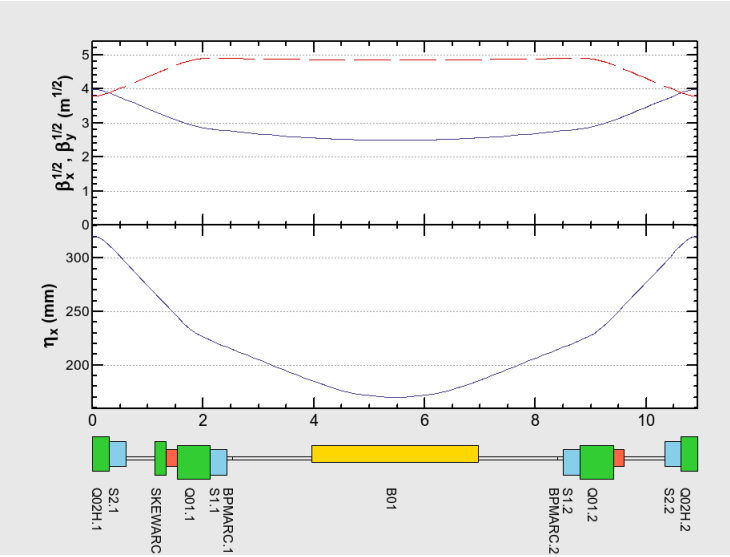



- **Large aperture => low R/Q**
- **Long cell: ~λ => low transit time factor**
- **Low field on the cavity wall**

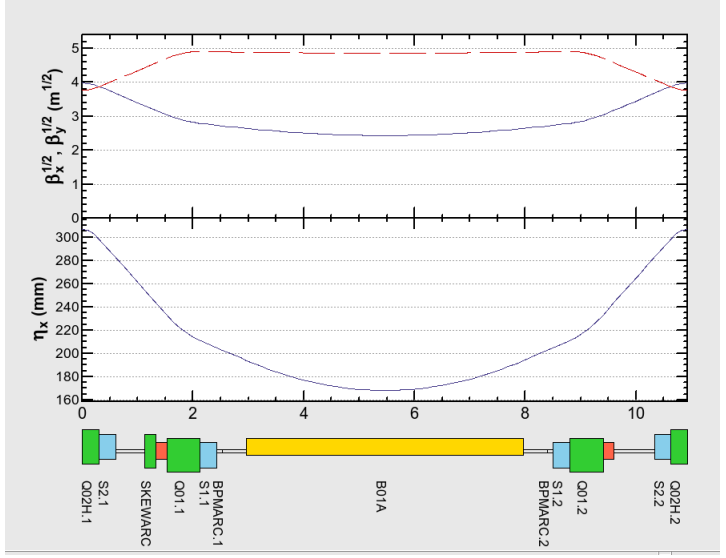
# *ILC Damping Ring Design: Changes from TDR*

*Kiyoshi Kubo (KEK)*

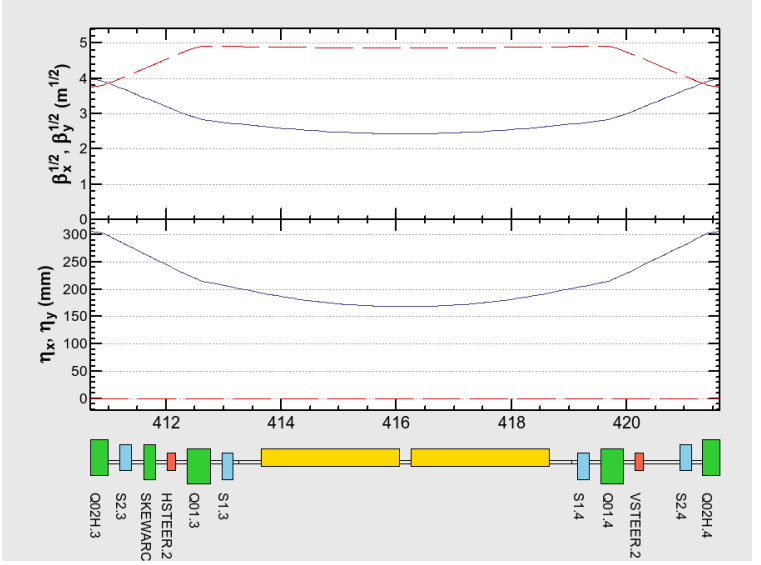
***TDR, 3 m bend***




***5 m bend***

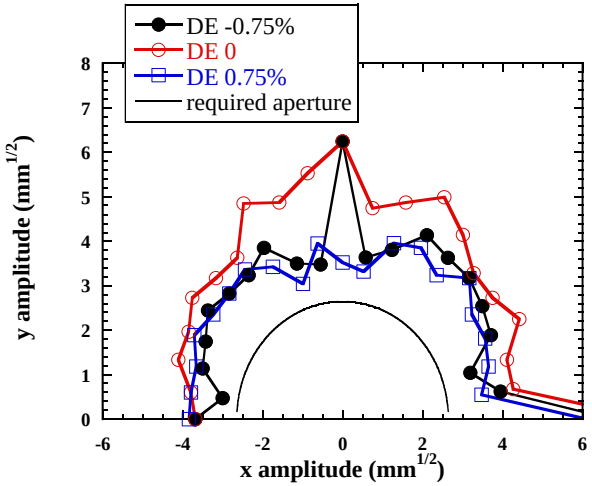



***Present Arc Optics Design***




Horizontal normalized emittance

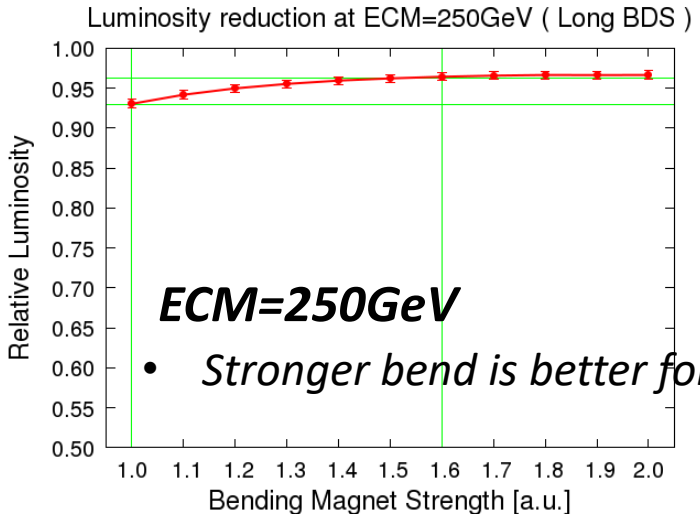
| Bend | No intra-beam scattering | With intra-beam scattering ($\gamma\varepsilon_y = 20$ nm) |
|---|---|---|
| 3 m (TDR) | $\gamma\varepsilon_x = 5.74\ \mu$m | $\gamma\varepsilon_x = 6.27\ \mu$m |
| 5 m | $\gamma\varepsilon_x = 3.14\ \mu$m | $\gamma\varepsilon_x = 4.00\ \mu$m |
| 2.4 m+ 2.4 m | $\gamma\varepsilon_x = 3.27\ \mu$m | $\gamma\varepsilon_x = 4.08\ \mu$m |



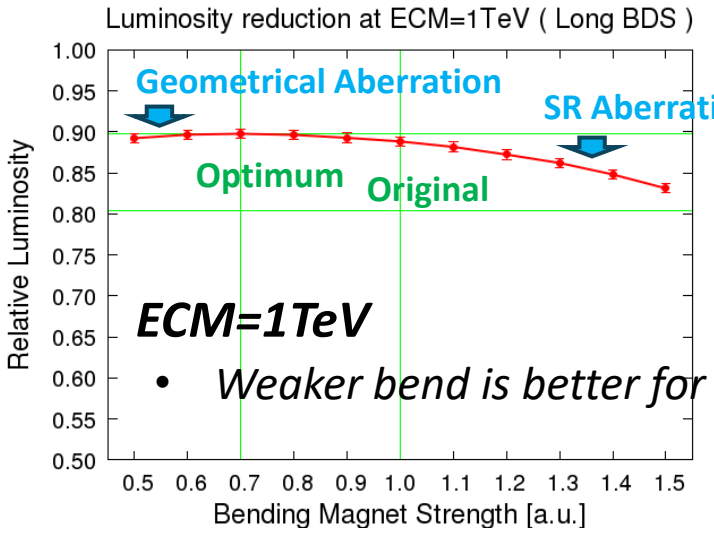
# Present design of ILC BDS

*Toshiyuki Okugi (KEK)*

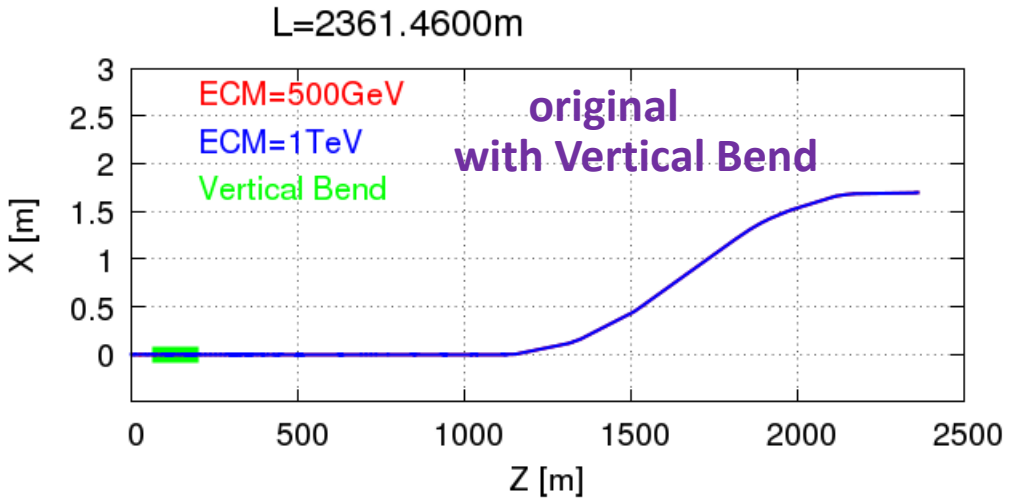
***ILC BDS was designed to be operated very wide energy range with same geometry.***

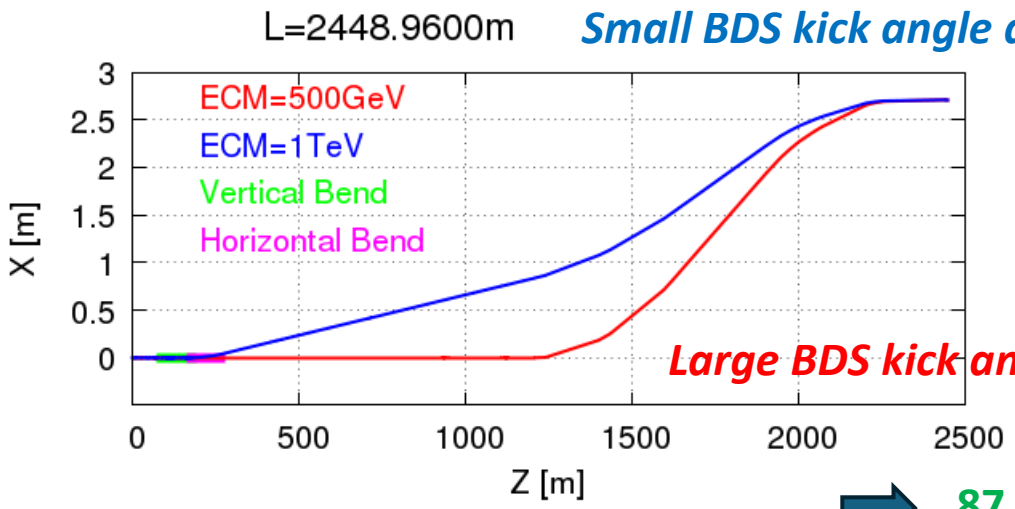



- *Stronger bend is better for lower energy.*




- *Weaker bend is better for higher energy.*




***Small BDS kick angle at high energy***

**1m shifted**

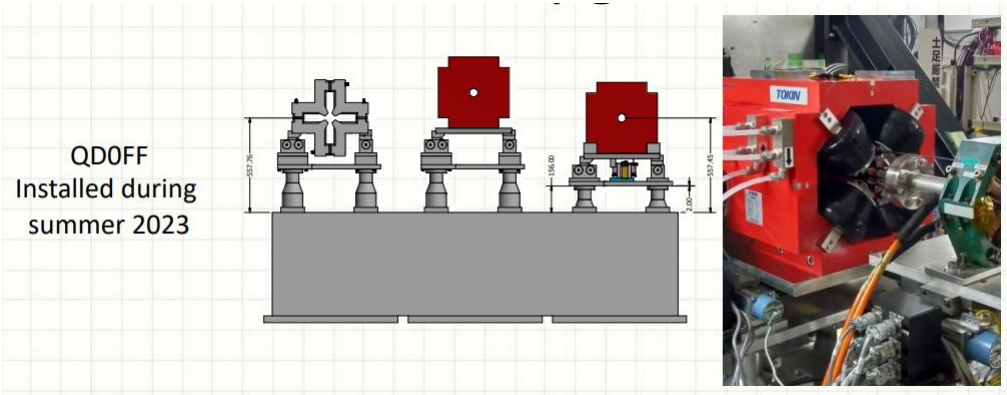
***Large BDS kick angle at low energy***

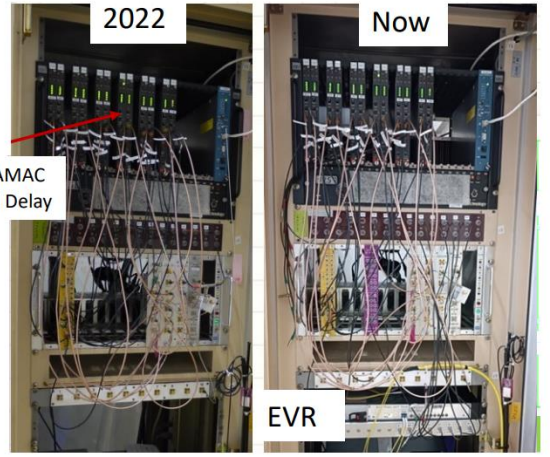
**87.5m lengthen**

# ATF2 STATUS AND OPERATION 2023-2024

*Alexander Aryshev (KEK)*

- *ATF upgrade strategy*
- *IPBSM new laser system*
- *ATF timing/RF system upgrade*
- *Magnet movers*
- *New FF magnets (QD0FF and QF1FF)*
- *Other upgrades*



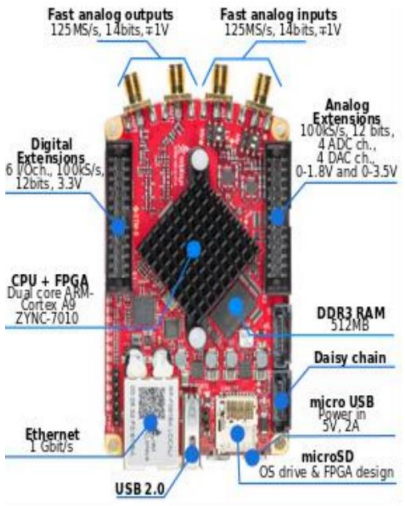



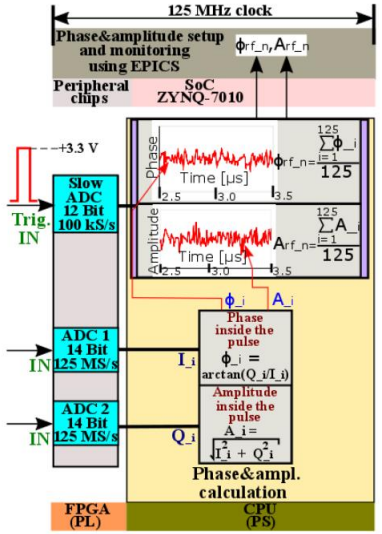

Peak-to-Peak data below shows about 2 times improvement!

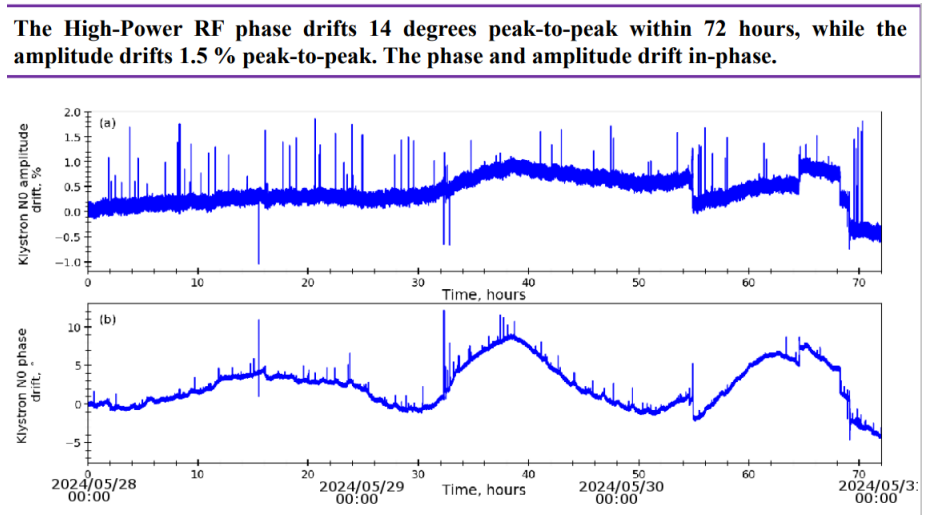
| e- charge at: | 2023 | 2024 |
|---|---|---|
| Linac End | ~0.01 | ~0.005 |
| IP | ~0.01 | ~0.005 |

# KEK ATF Linac and Damping Ring klystrons High-Power RF field phase and amplitude stability study

*Konstantin Popov (KEK)*



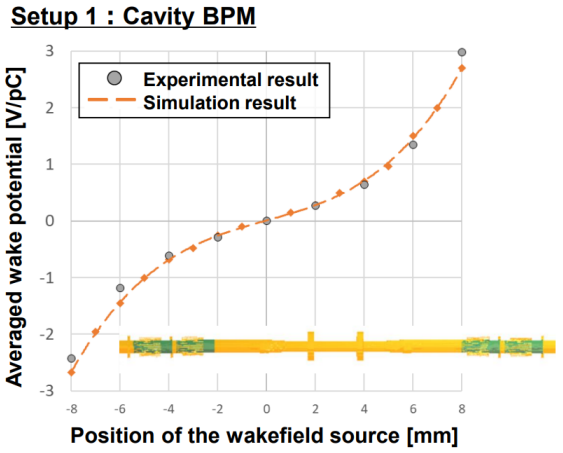



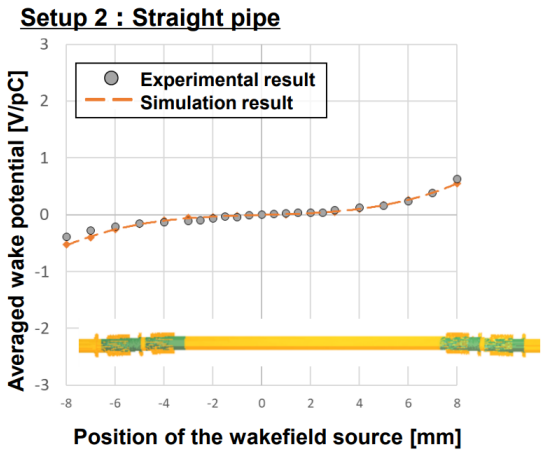



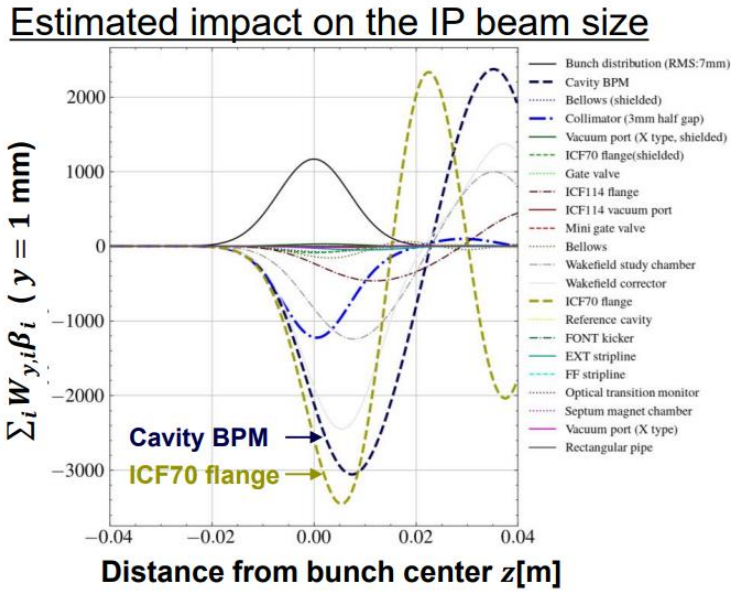
# Wakefield study at ATF2 beamline

*Yuki Abe (KEK)*

## Evaluation of the wakefield effects as a single wakefield source



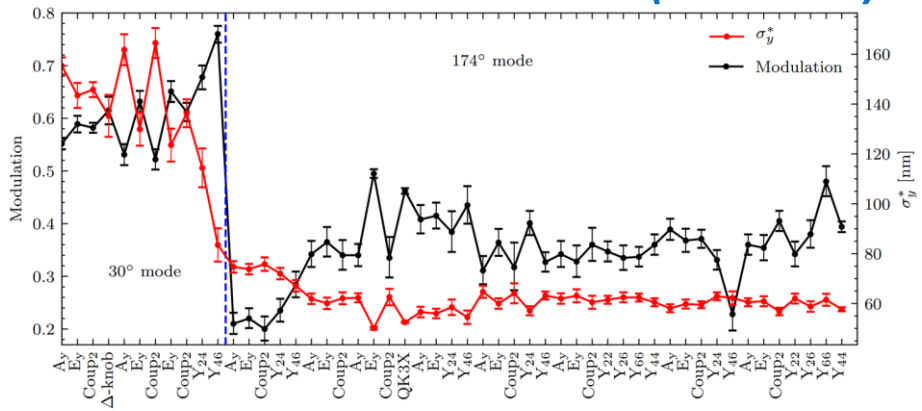



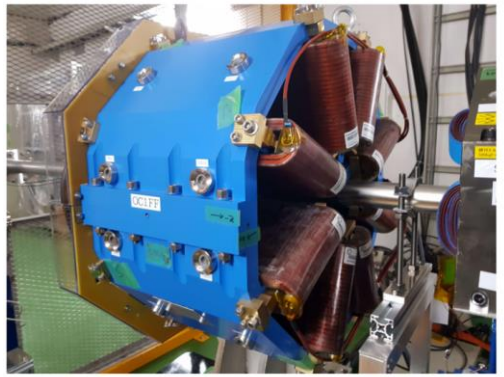

# Ultra low beta* experimental studies at ATF2 and future plans

*Andrii Pastushenko (CERN)*

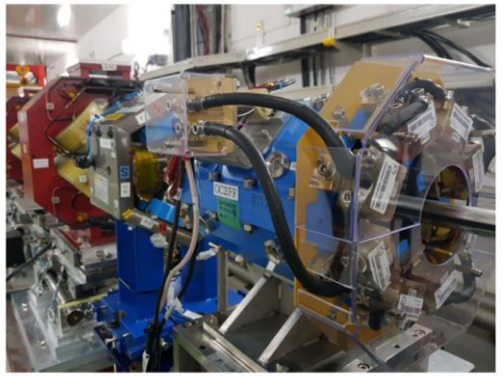
## Small beam size achievements (June 2019)




## Octupoles



OCT1FF



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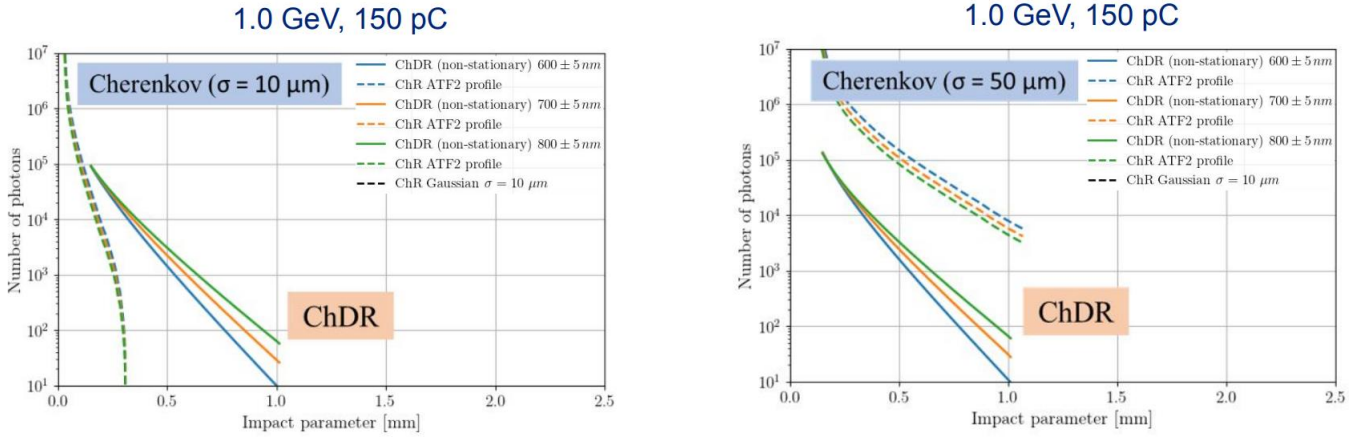
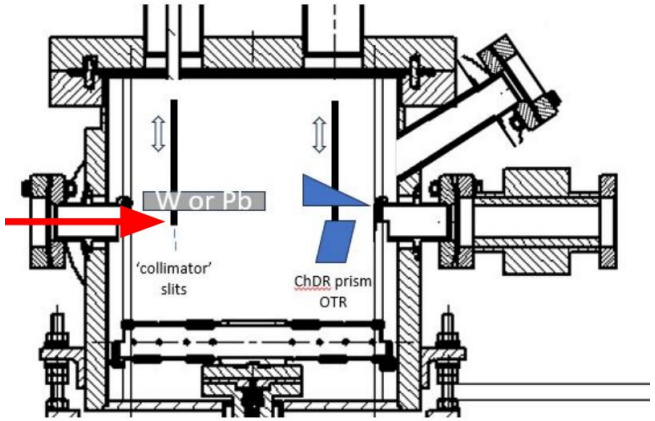
# ATF2 incoherent Cherenkov diffraction radiation monitor status and plans

*Kacper Lasocha (CERN)*

## Summary of 2023 tests




## Planned upgrade of ChDR setup

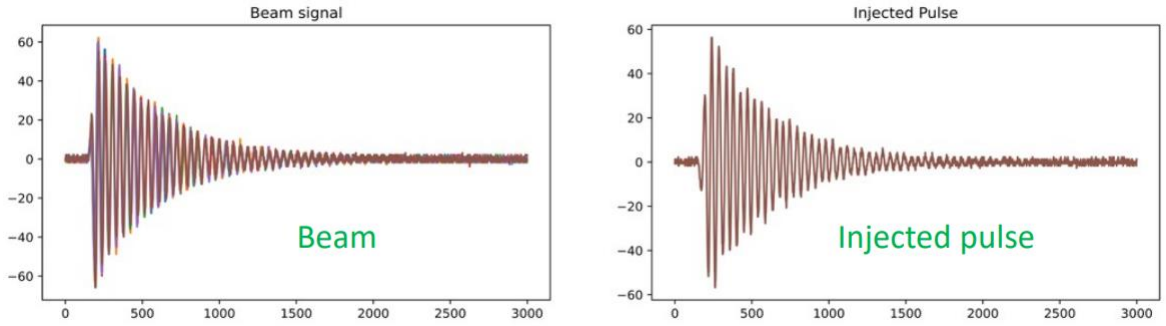


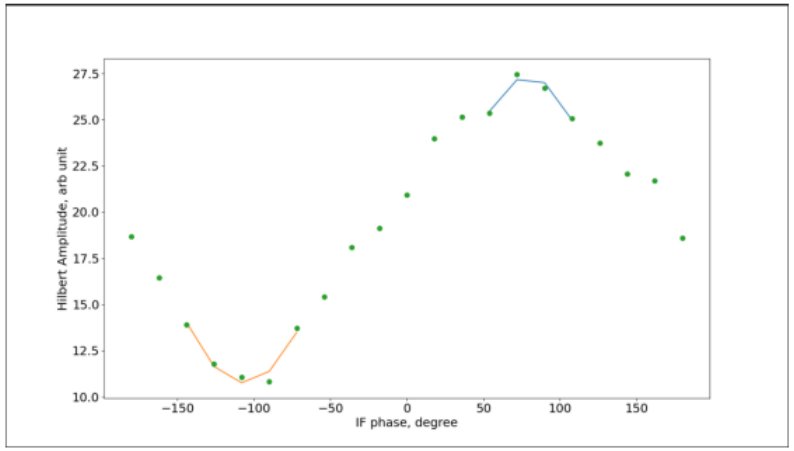

# ATF2 Cavity BPM system: Progress with calibration pulse injection

*Alexey Lyapin (RHUL)*

### *Calibration pulse injection*

- *Cavity-quad offsets: reduce the useful dynamic range*
- *Regular calibrations required*
- *Wakefields (as a consequence of the offsets)*

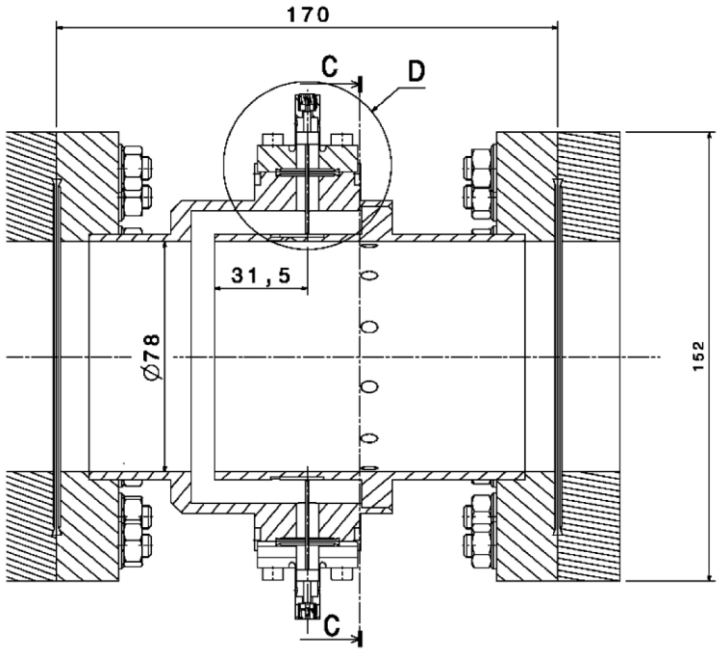


# *Cavity Beam Position Monitor for the ILC Main Linac: Status and Plans*

*Laura Karina Pedraza (IFIC)*

***Re-entrant cavity BPM***




Methods employed to enhance the spatial resolution and meet the Main Linac requirements:

- The Saclay design is under evaluation to enhance BPM sensitivity and spatial resolution
- Simulation of the read-out system in MATLAB to asses the influence of all components on the overall system performance
- BIR-ME 3D method estimates the cBPM output signal with careful definition of the beam.

A preliminary plan is underway to develop a prototype integrating the SCQ and BPM assembly into a test cryostat.

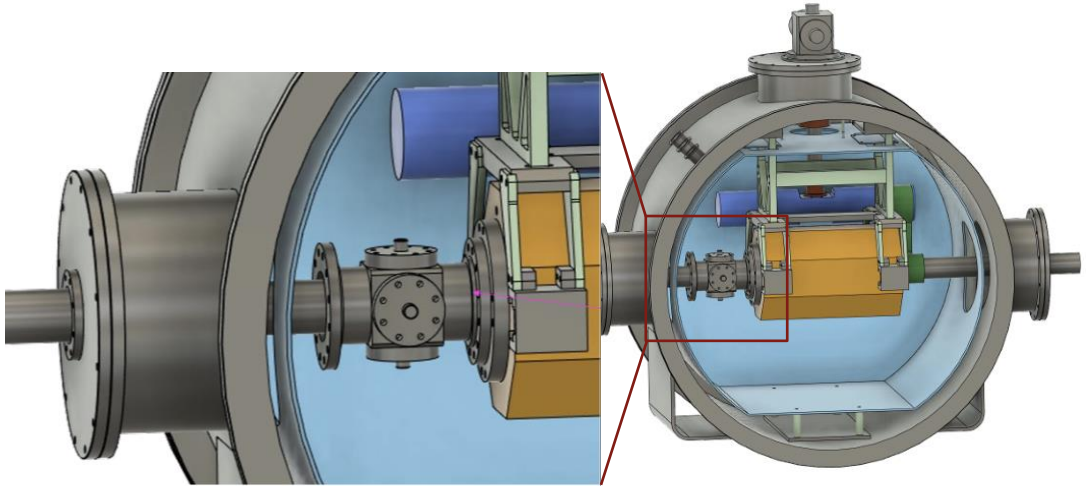


Figure: Cryostat accommodating BPM and SC quadrupole