Future plan of ultra-low β_y^* study

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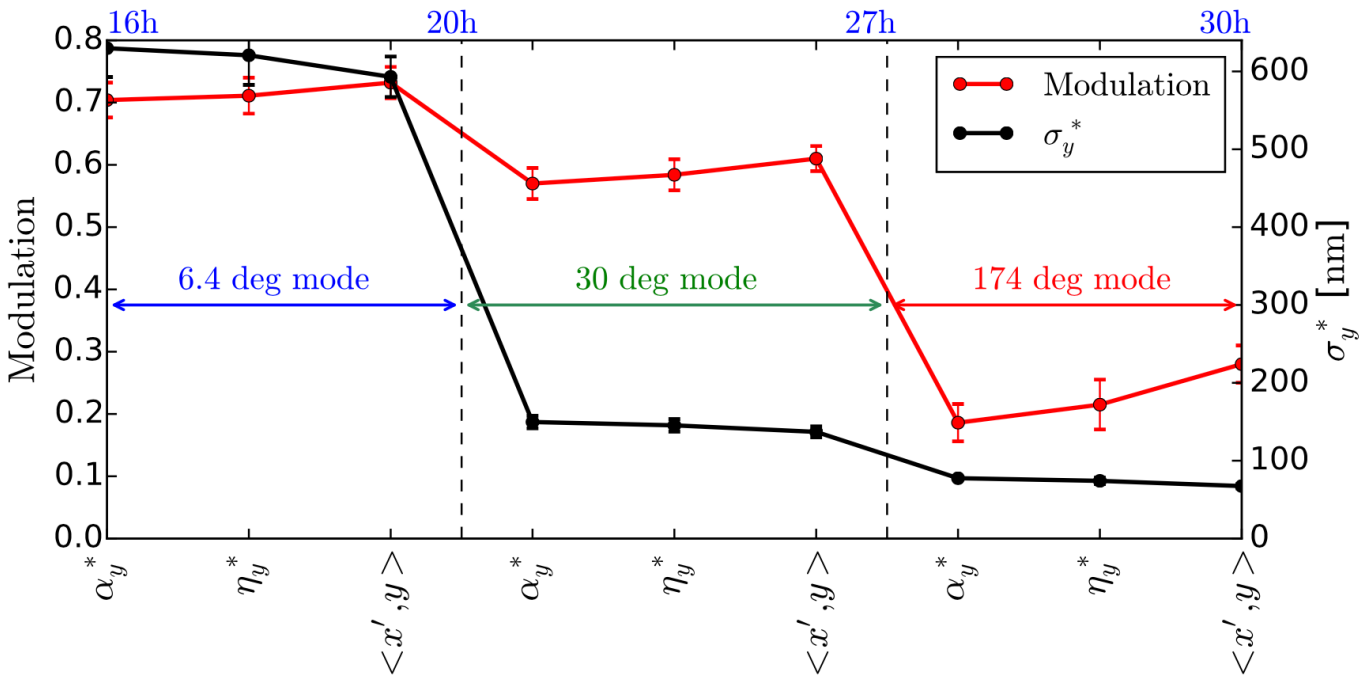
November 21, 2018

Ultralow β_y^* tuning in 2017-2018

- $\sigma_y^* = 97 \pm 6$, 70 ± 6 nm in Dec. 2017 and Feb. 2018
- Attempt to reduce σ_y^* using Oct. but not fully proved
- Optics matching (β_x^*), 2nd aberration correction and contiguous tuning shifts



[1] F. Plassard, PhD thesis, Universite Paris-Saclay, 2018

Keys for ultralow β_y^* tuning

- Optics re-optimization and matching
  optimal β_x and knobs, octupoles
- Performance of IPBSM ($\sigma_{y,\mathrm{meas}} = ?$)
  laser stability, position/phase jitter, BG fluctuation (?)
- Wakefield induced beam size growth
  $\Rightarrow \sigma_{wk} \approx 21.4$ nm for $\beta_y^* = 25$ μm and 30%$\sigma_{y'}$ angle jitter
  $\sigma_{y,\mathrm{min}} \geqslant 30$ nm $\Rightarrow$FB? (25 nm)
- Tuning experiments
  manpower, training on tuning, machine time and stability, local support, mOTR, BBA and orbit control

Plans for Dec. operation

- $25\beta_x^* 0.25\beta_y^*$ optics $\rightsquigarrow$ σ_y<70 nm(?) w/ octupoles
- 2 shifts (1st week) + dedicated week

	1:00 – 9:00	9:00 – 17:00	17:00 – 25:00
Mon		Start	Start/Tuning (Naito? Renjun)
Tue	Tuning (CBPM Calib.) Alex? Andrii	Tuning (Match optics+IPBSM?) Okugi-san? (Renjun)	Tuning () Andrii, Renjun
Wed	Tuning (Linear knobs) Vera, Jim, Andrii	Tuning (Linear+nonlinear knobs) Kubo? Kuroda?	Setx. alignment Jim, Renjun
Thu	Setx. alignment Jim, Vera	Tuning (Linear+nonlinear knobs) Kubo? Kuroda?	Tuning (Linear+nonlinear knobs) Vera, Andrii
Fri	Tuning (Linear+nonlinear knobs) Vera, Renjun	Tuning/ Intensity dependence Pierre, Renjun	?

[1] adding fixed-aperture collimator to reduce BG conditions (?)
[2] Schedule to be fixed

Further studies to reduce σ_y^*

- Optimization of optics/knobs and tuning simulation (dedicated knobs)
- Possible min. σ_y could be observed (< 30 nm?)
  - IPBSM performance (reduction factor)
  - wakefield effect suppression
- Further/deeper training of operators (mOTR, FS, IPBSM), script for optics rematching (SAD), align of sext. (wrt. σ_y^*) and oct.
- Octupoles for nominal optics tuning (?)

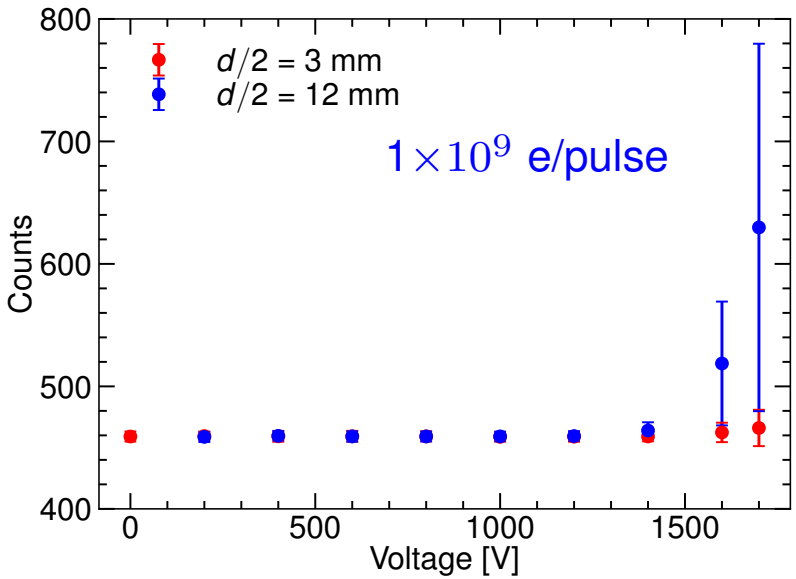
Conclusion

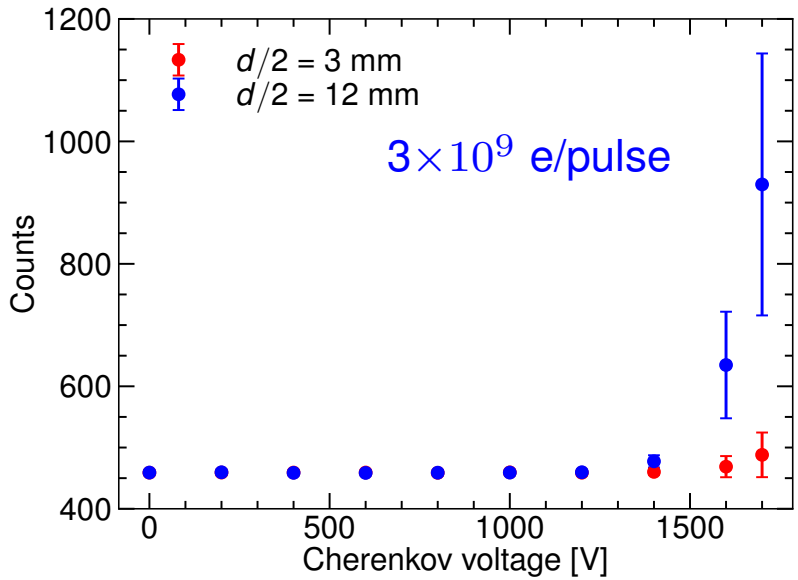
- Preparation of ultra-low β_y tuning w/o previous experienced operators (Fabien and Edu) is in process
- 5 persons from CERN and support from ATF experts would be of great important and well appreciated
- Further studies would be the optimization of optics/knobs/octupoles, alignment/tuning tools and the determination of the low limit of σ_y^* at ATF2
- Contiguous support from KEK and ATF2 collaboration will be essential!

Thank you for your attention!

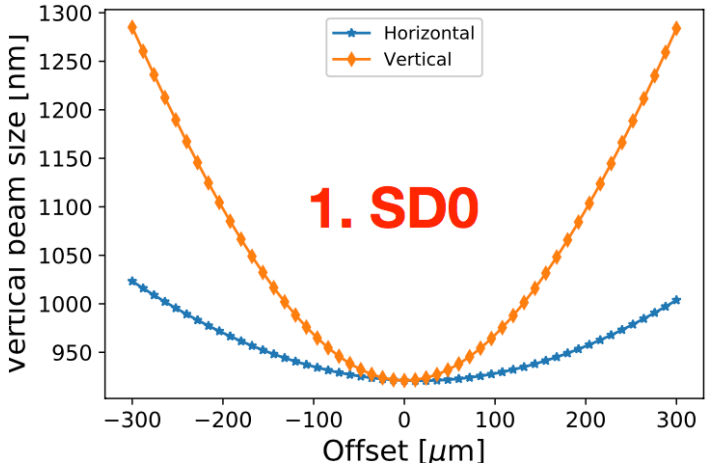
Cherenkov detector BG

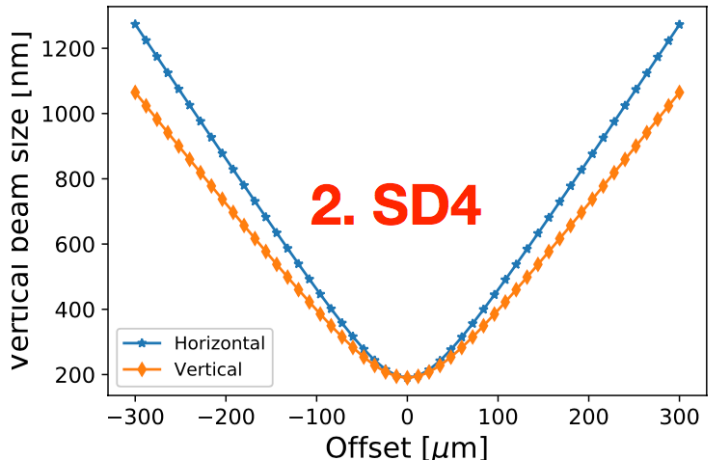
- 10bx1by optics
- For HV=1700 V, BG counts 149 ->15 (214 -> 36)

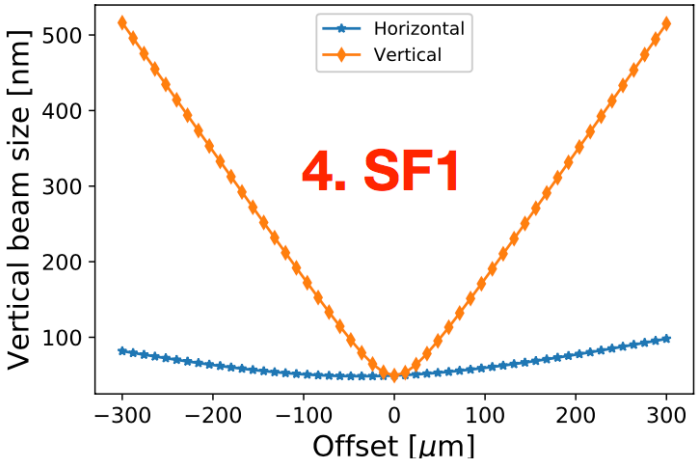


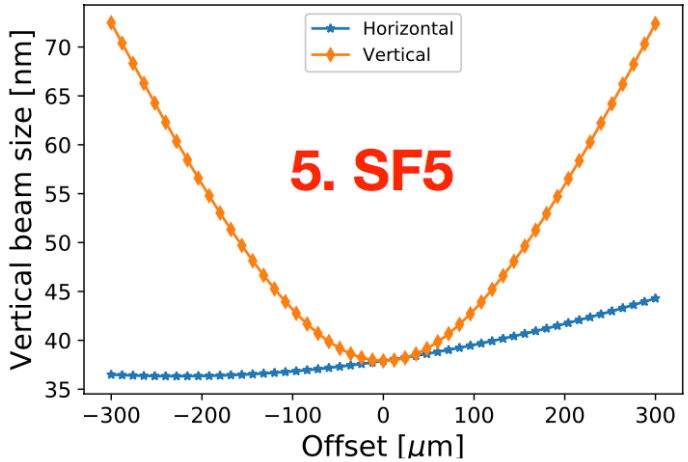


- Sextupoles alignment method proposed by Jim Ogren









[1] Slide courtesy of J. Ogren