SUMMARY OF MARGINS VS. β*

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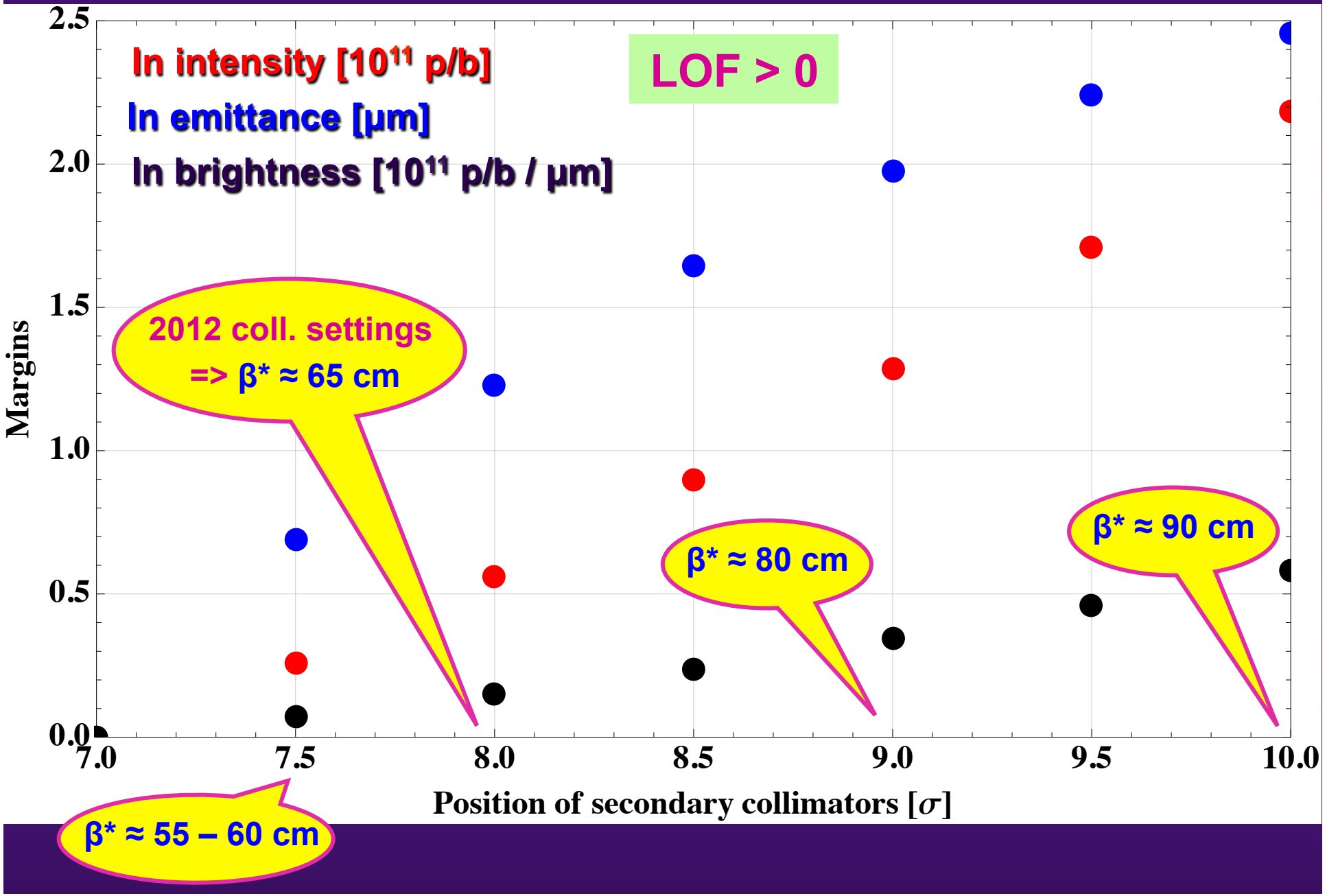
- β* reach vs. collimator settings: assumptions
- Impedance
- Beam-Beam

β* reach vs. collimator settings: assumptions

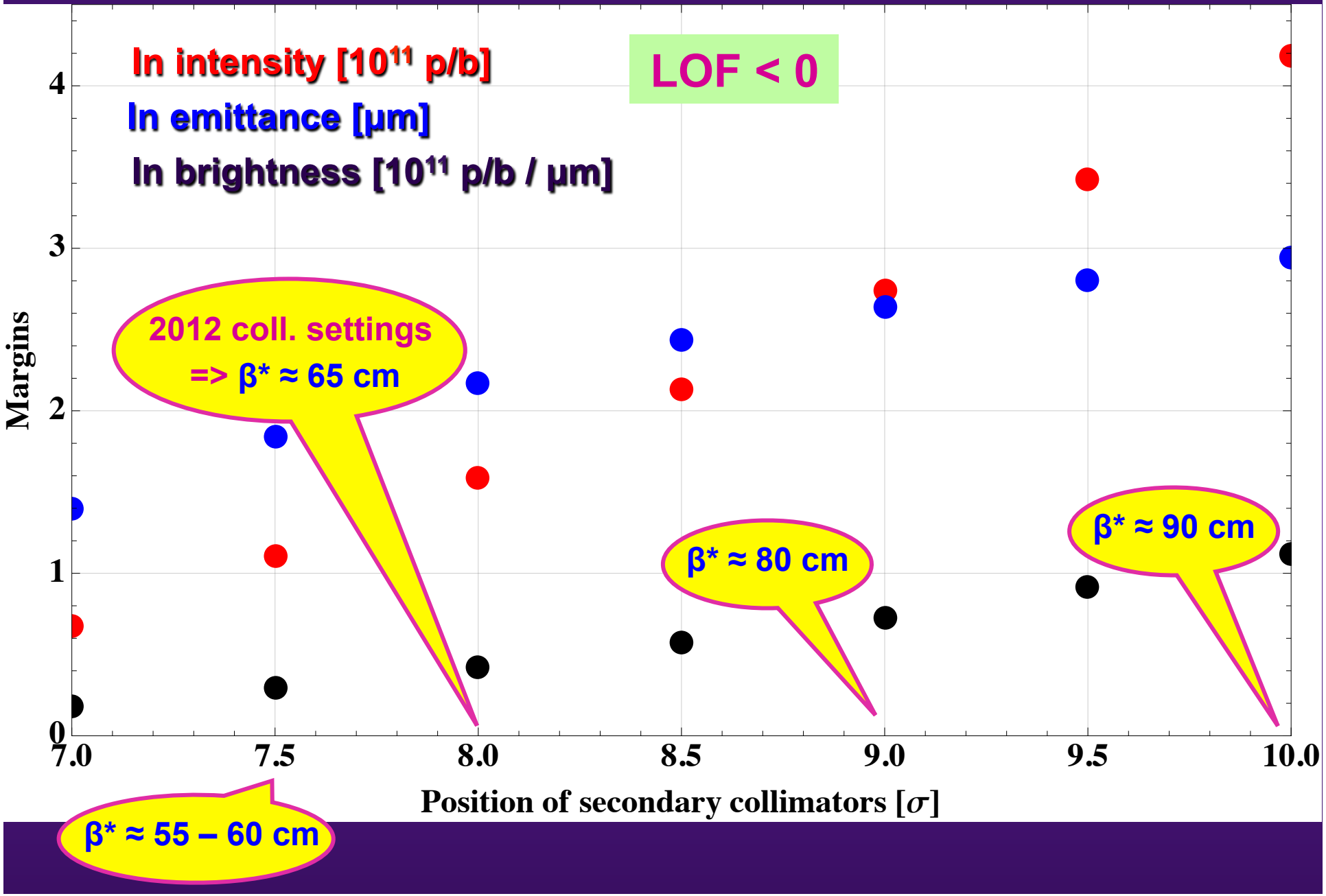
- Reachable β* (vs. collimator settings) depends on how much extra margin we put into machine protection (TCT-TCDQ retraction) and Xing angle
  - 0) β* = 65 cm for TCSGs at 8 σ and same assumptions as in Evian2014 (mm kept settings, 11 σ BB sep, very good aperture, 2012 machine stability)
  - 1) β* = 80 cm gives ~ 2 σ more margin than at 65 cm. Using TCSGs at 9 σ (meaning retracted by 1 σ) for 80 cm, means that we use 1 σ margin for something else
    - + 1 σ MP, staying at 11 σ BB sep, or
    - + 2 σ Xing angle (or a mix)

    As 1 σ aperture margin is ~ 2 σ in BB sep
  - 2) β* = 90 cm gives just above 3 σ more margin. Using TCSGs at 10 σ (meaning retracted by 2 σ) for 90 cm, means that we use ~ 1 σ for something else as above
  - 3) β* = 55 cm gives about 1.5 σ less aperture than 65 cm if we stay with 11 σ BB separation. The predicted aperture is exactly compatible with what we can protect using the collimator settings with 2 σ retraction. In fact, this corresponds to 55 - 60 cm, since the aperture margin is so close to zero that we cannot today guarantee that we reach 55 cm unless we also change something else apart from the coll. settings. This something else (decrease BB sep, decrease MP margin) would then come as an additional assumption

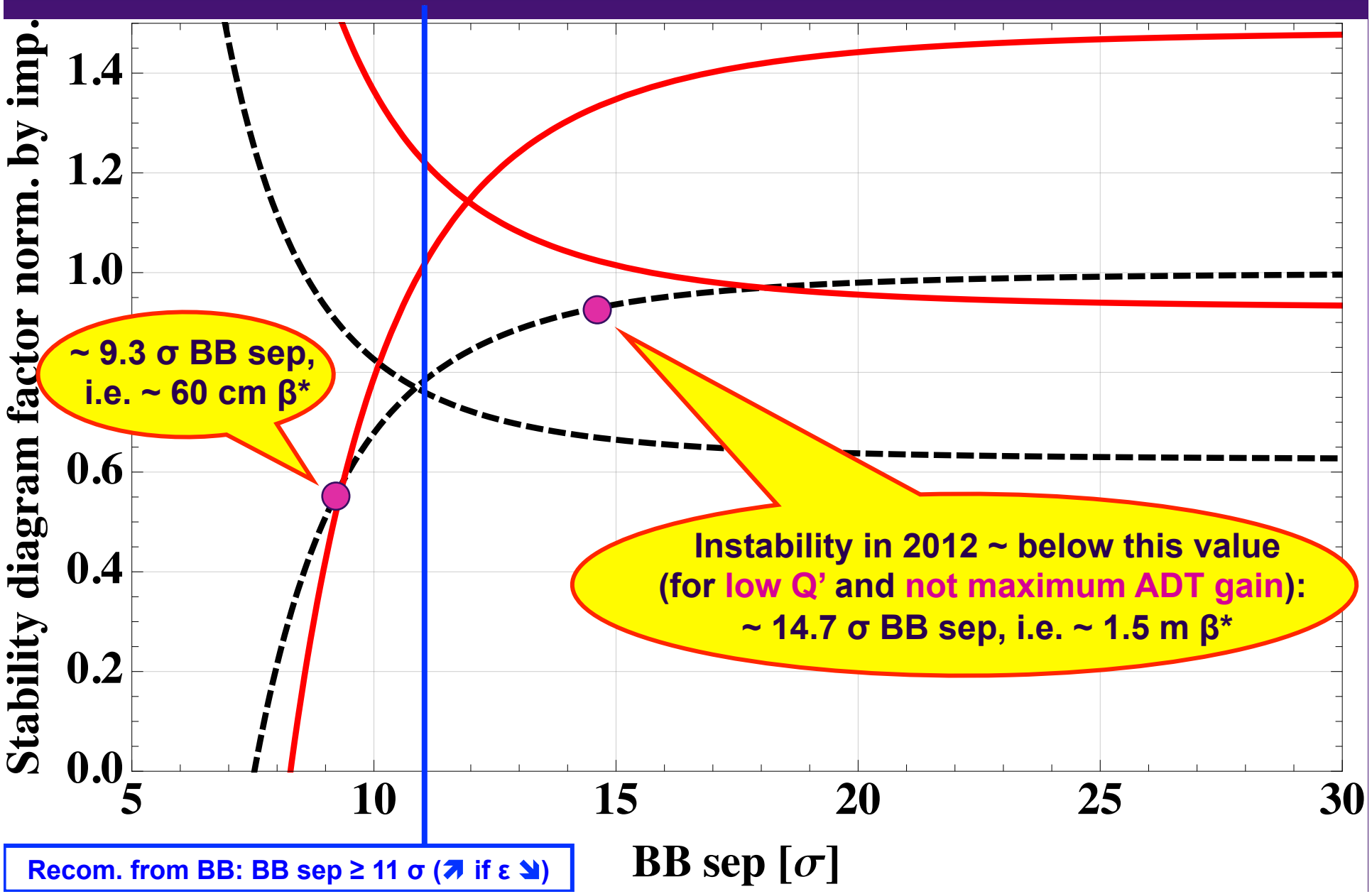
IMPEDANCE MARGIN wrt nominal bunch (1.15E11 p/b, 3.75 μm)



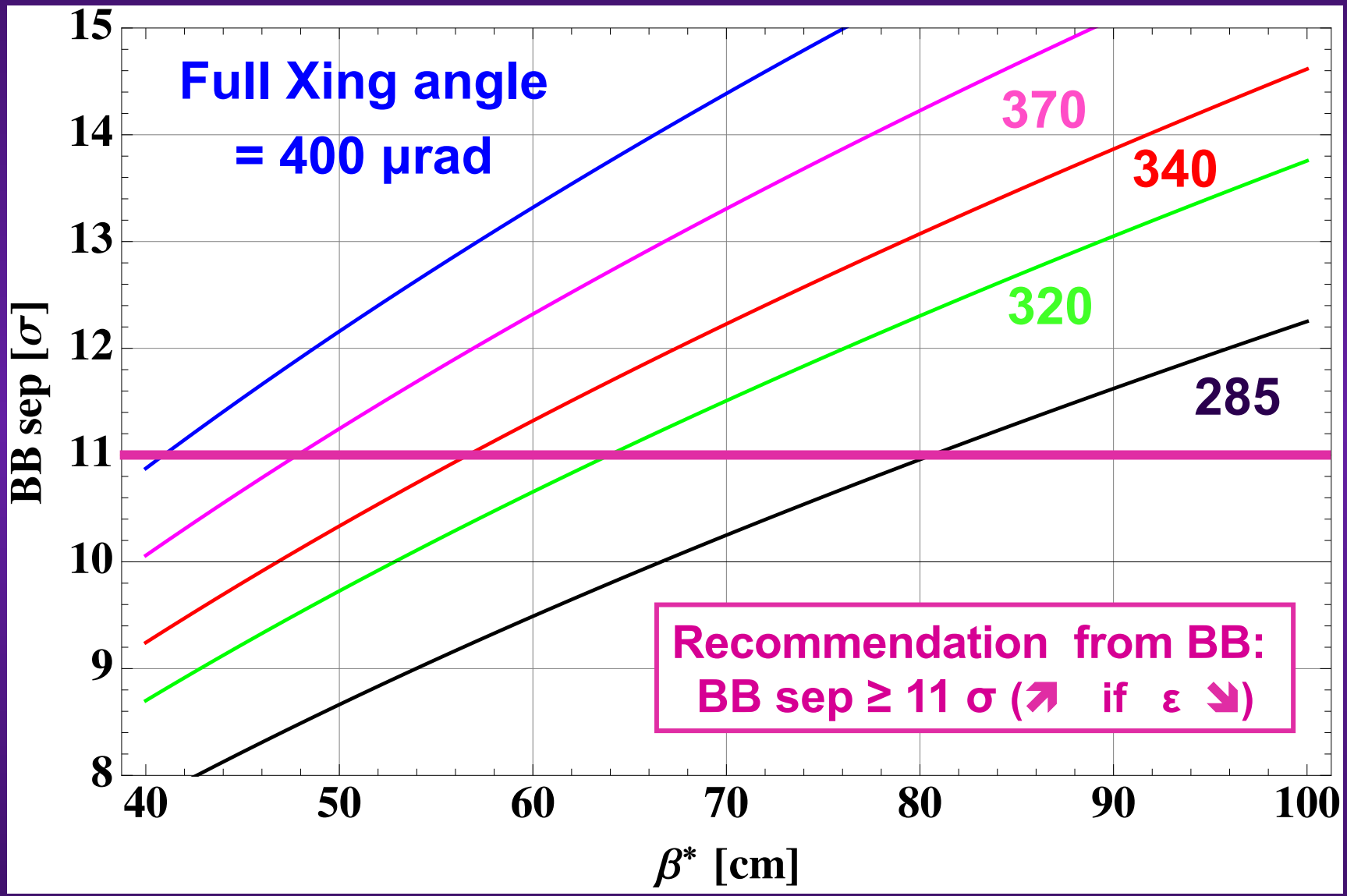
IMPEDANCE MARGIN wrt nominal bunch (1.15E11 p/b, 3.75 μm)



BEAM-BEAM MARGIN wrt nominal bunch (1.15E11 p/b, 3.75 μm)

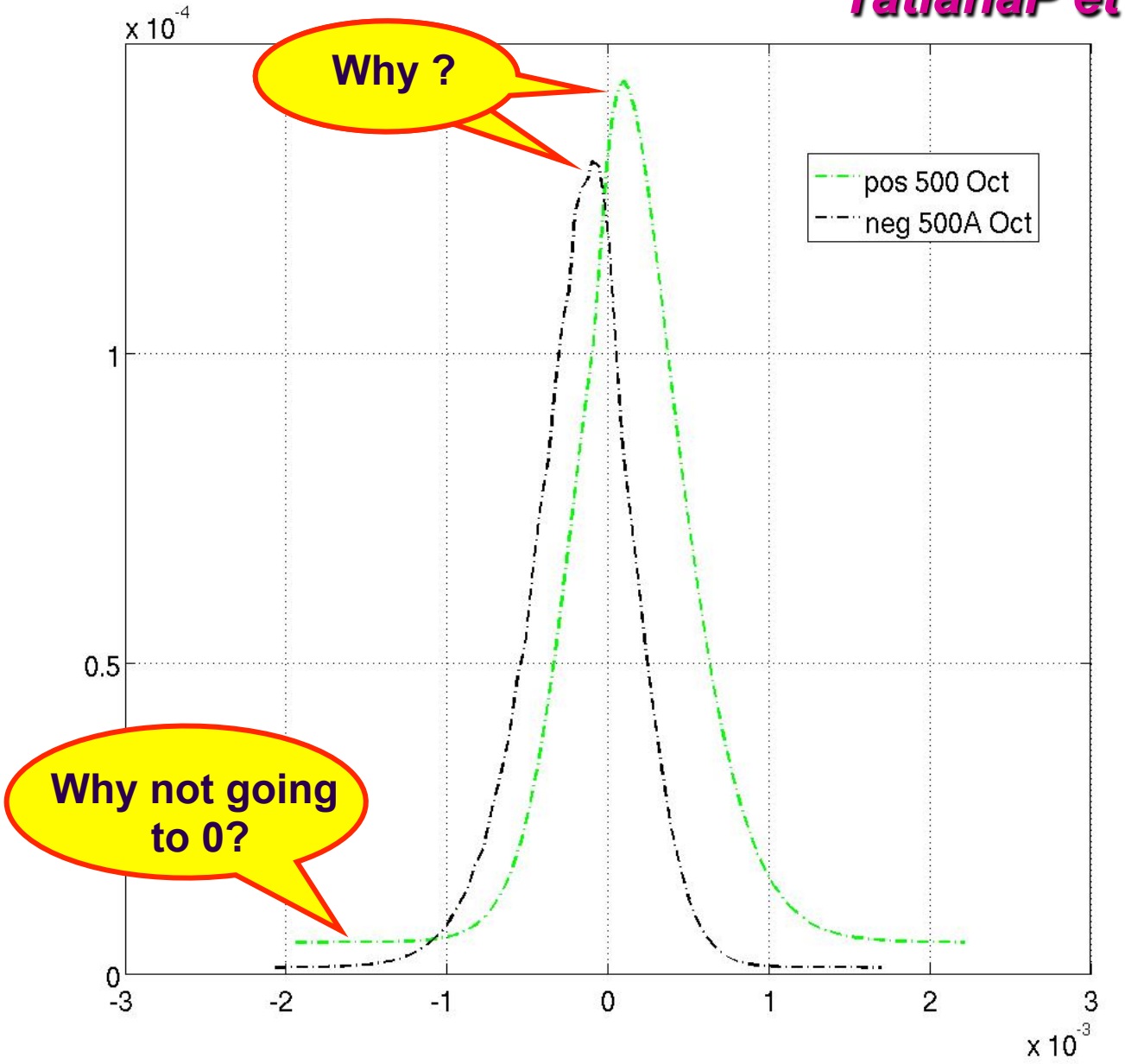


BEAM-BEAM MARGIN wrt nominal bunch (1.15E11 p/b, 3.75 μm)



FOLLOW-UP OF BB STUDIES FOR NOMINAL 2015 CASE (1/5)

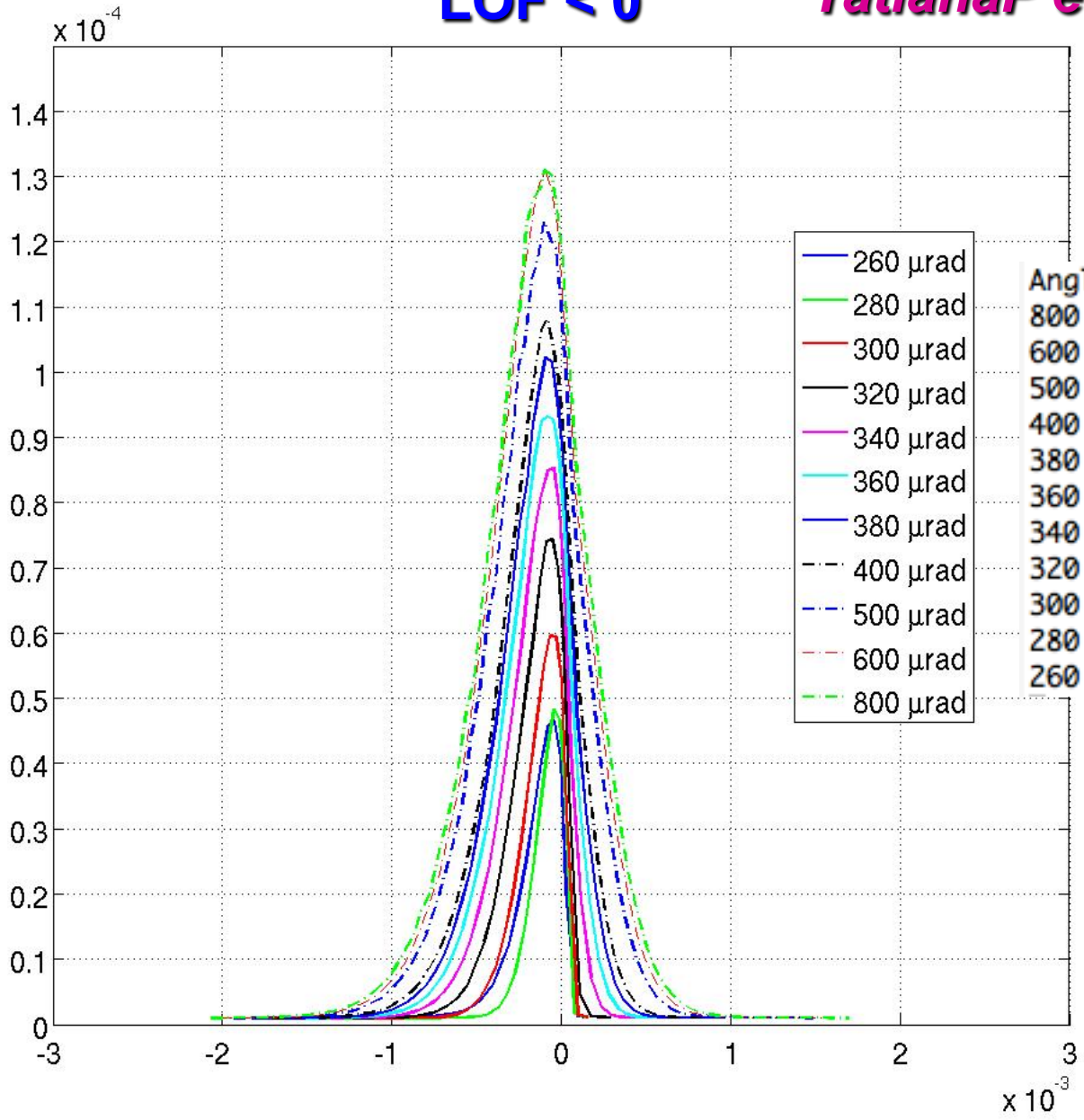
TatianaP et al.



FOLLOW-UP OF BB STUDIES FOR NOMINAL 2015 CASE (2/5)

LOF < 0

TatianaP et al.

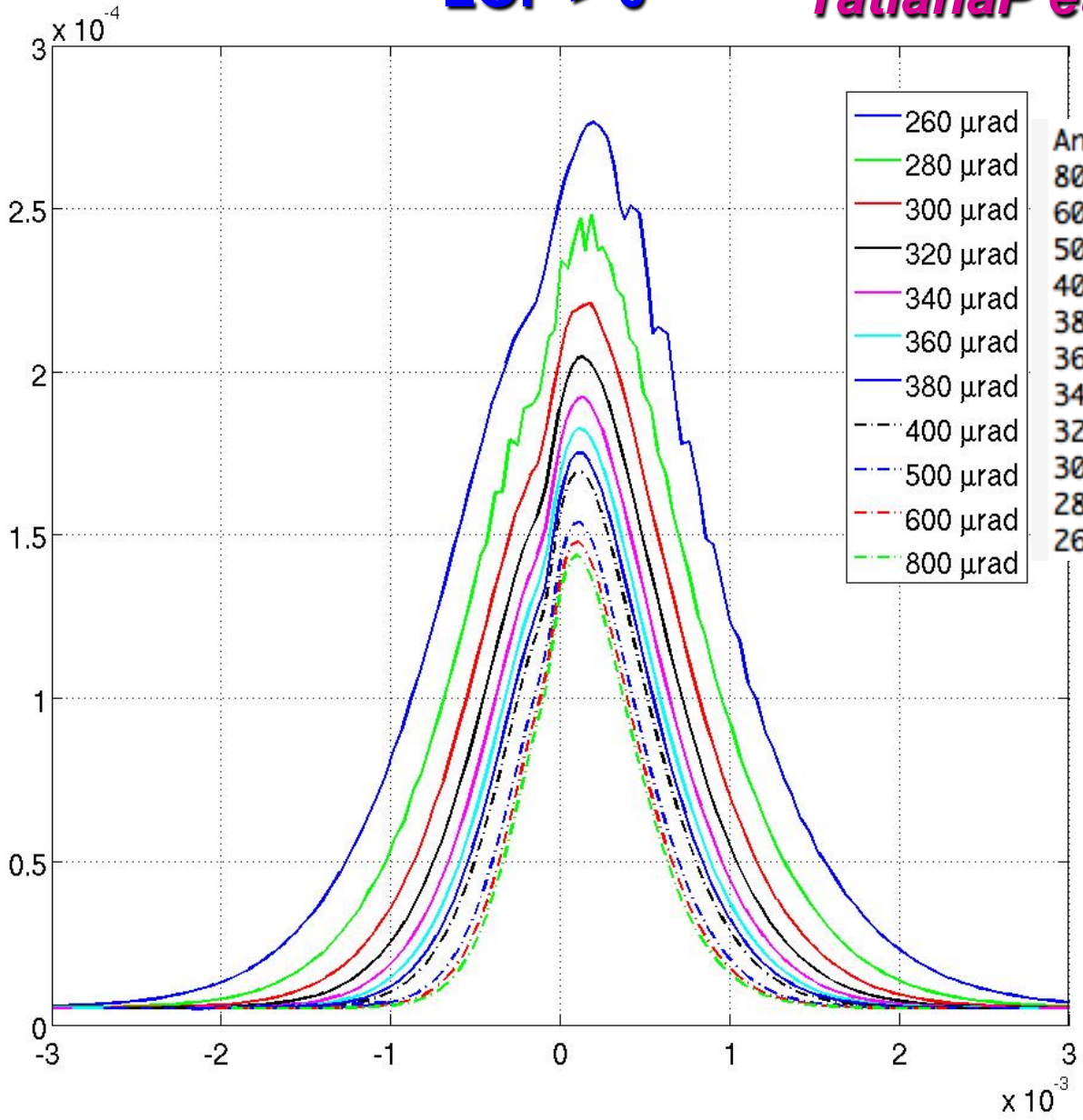


Angle	bbsep	Im(DQ)
800	26.5	0.000118
600	19.85	0.000115
500	16.54	0.000109
400	13.23	0.000095
380	12.6	0.000089
360	11.9	0.000083
340	11.25	0.000074
320	10.6	0.000064
300	9.93	0.000053
280	9.26	0.000044
260	8.6	0.000037

FOLLOW-UP OF BB STUDIES FOR NOMINAL 2015 CASE (3/5)

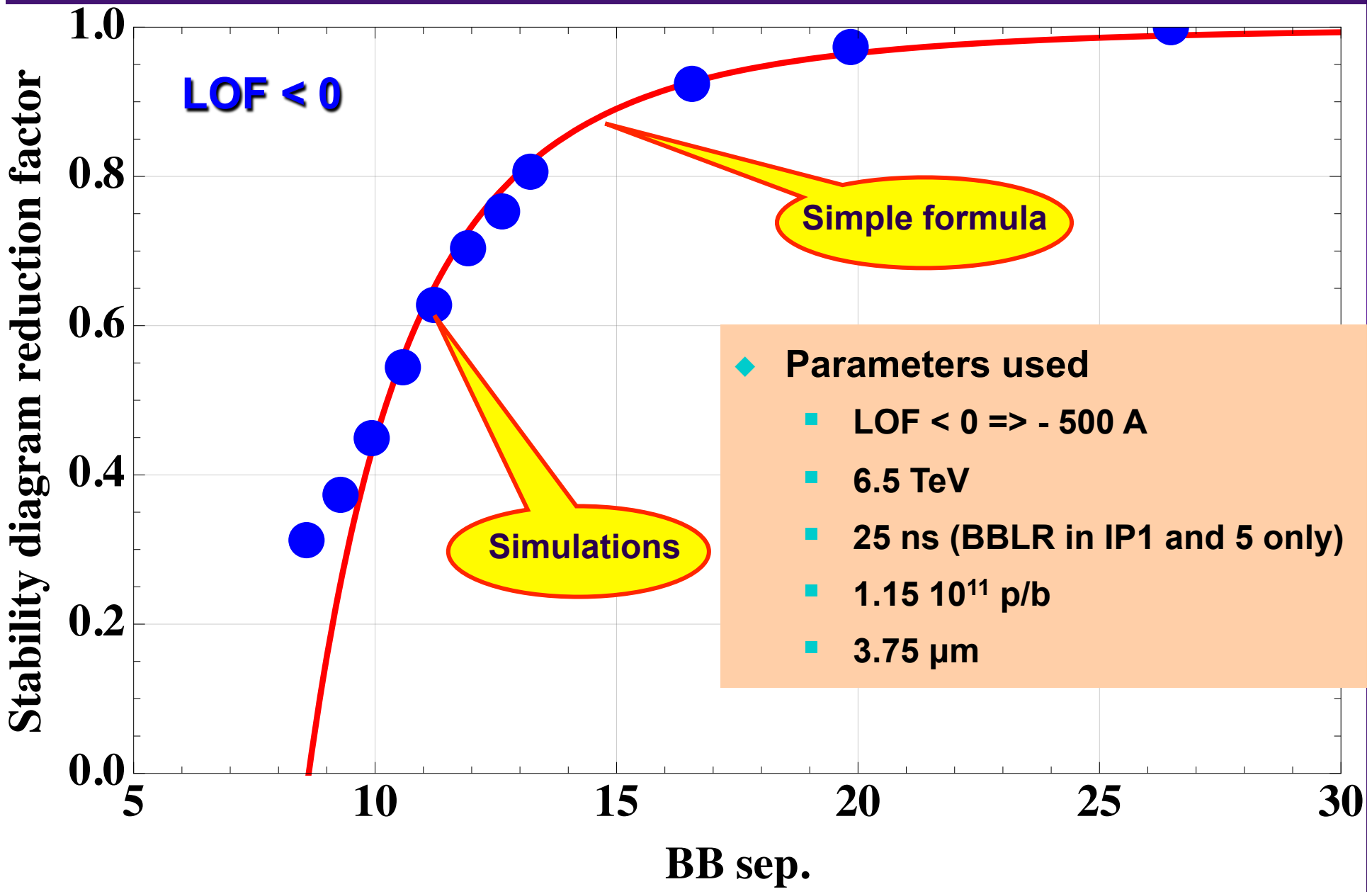
LOF > 0

TatianaP et al.



Angle	bbsep	Im(DQ)
800	26.5	0.000131
600	19.85	0.000135
500	16.54	0.000141
400	13.23	0.000156
380	12.6	0.000161
360	11.9	0.000169
340	11.25	0.000178
320	10.6	0.000189
300	9.93	0.000205
280	9.26	0.000231
260	8.6	0.000254

FOLLOW-UP OF BB STUDIES FOR NOMINAL 2015 CASE (4/5)



- Parameters used
  - LOF < 0 => - 500 A
  - 6.5 TeV
  - 25 ns (BBLR in IP1 and 5 only)
  - 1.15 10^{11} p/b
  - 3.75 µm

FOLLOW-UP OF BB STUDIES FOR NOMINAL 2015 CASE (5/5)