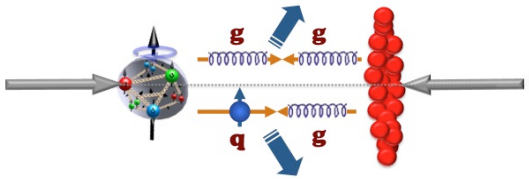

Effect of large horizontal orbit excursion in the Triplets of IP6(2)

M. Bai, S. Tepikian, A. Marusic, V. Litvinenko
V. Ptitsyn, Y. Luo, M. Blaskiewicz, W. Fischer
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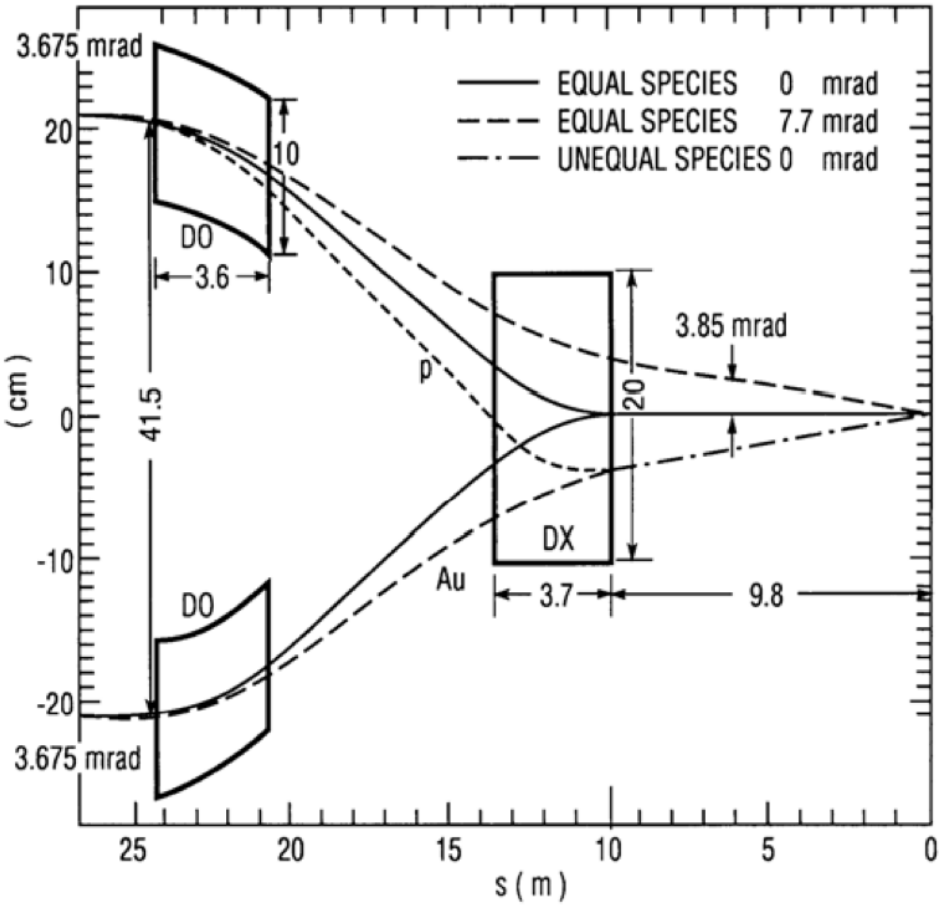
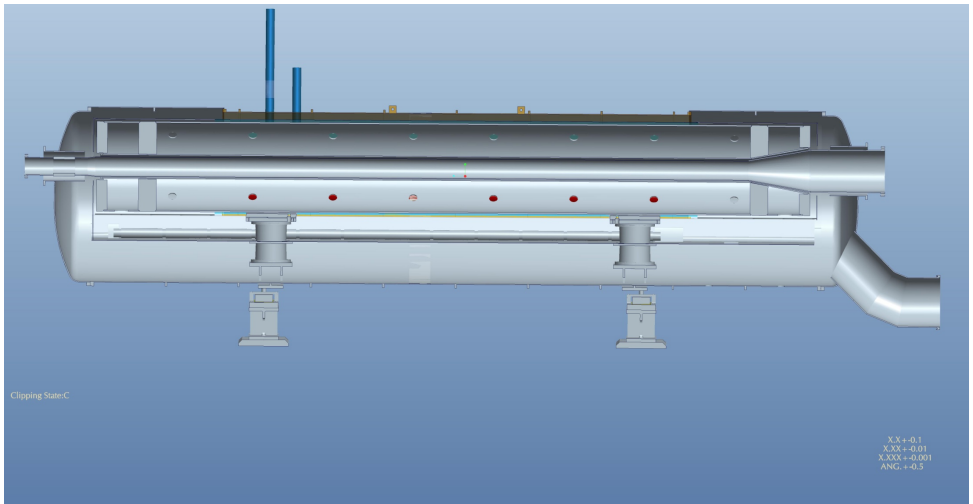
April 17, 2014

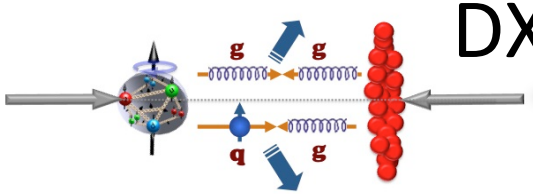
RHIC Interaction Region Layout

Beam split dipole DX magnet is first magnet on either side of IP

- L_{mag} = 3.7 m, B_{max} = 4.3 T
- large aperture (18 cm coil ID)
- only magnets that need training (~5 for IR6/8 only)







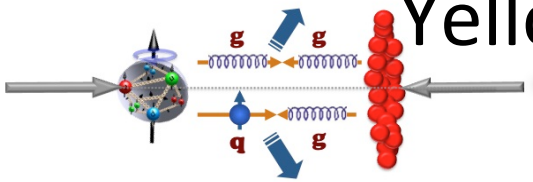
DX Aperture Scan Results (Y. Luo)

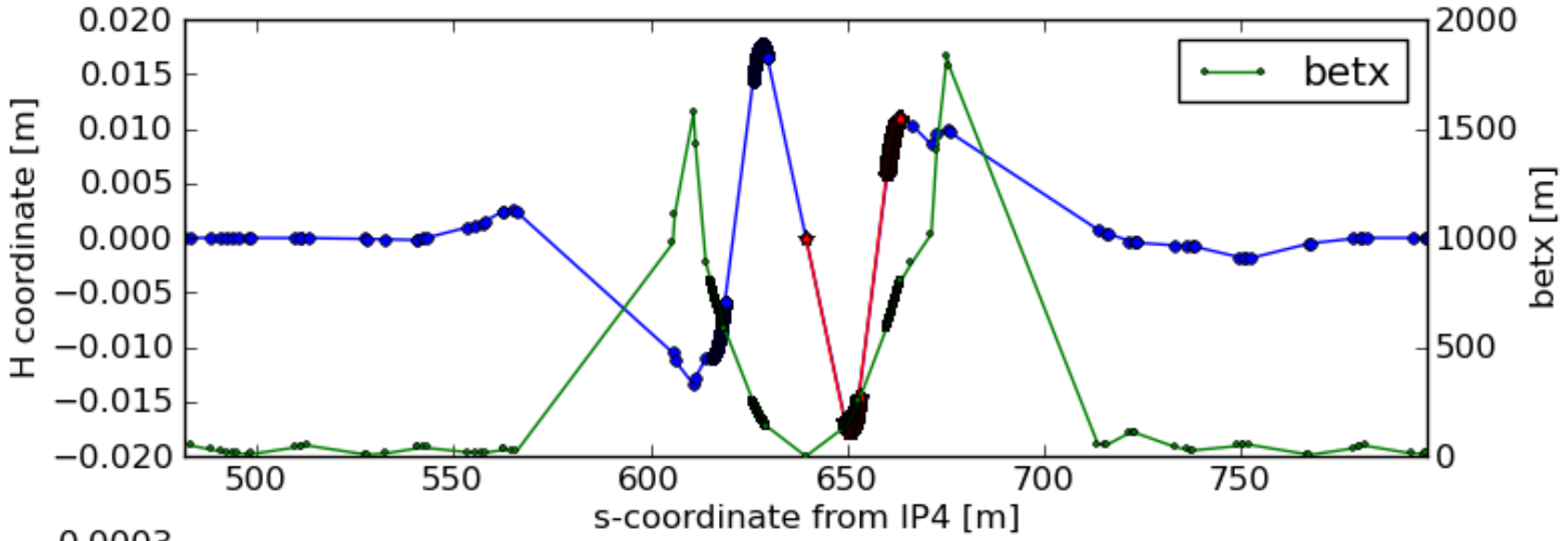
0mrad **3.25mrad**

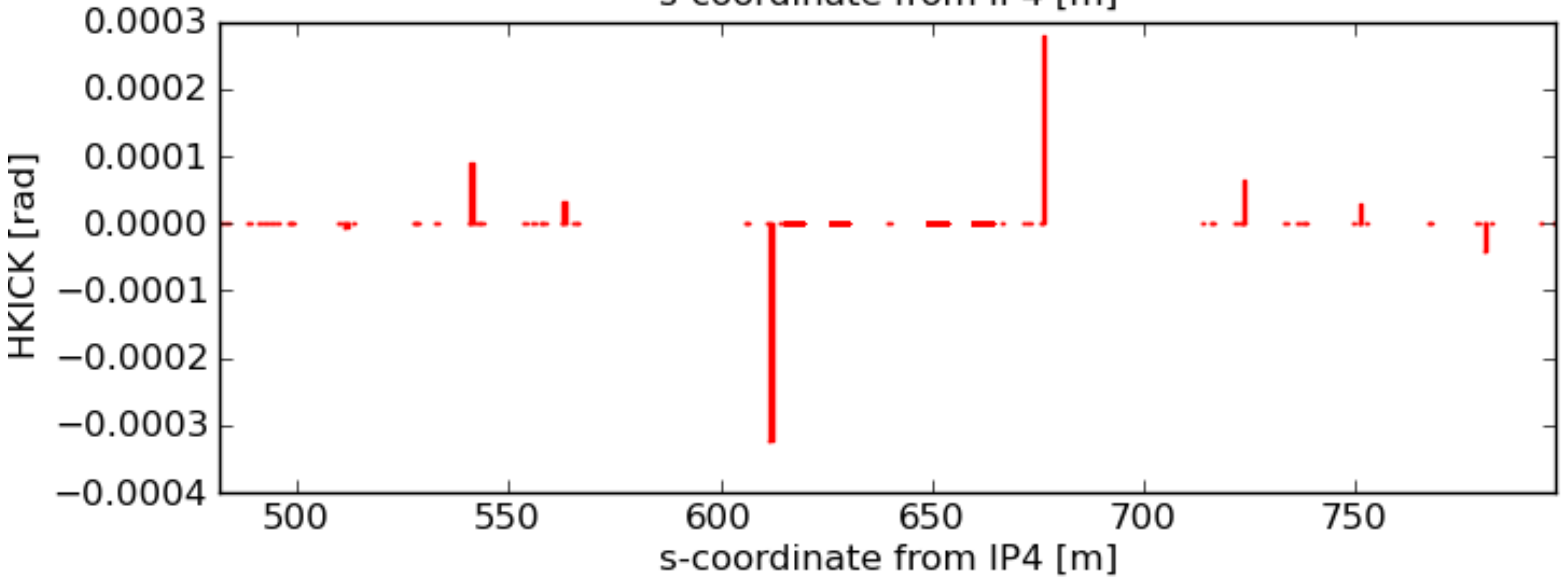
IR	DX Max Current (A)	DX Min Current (A)	Blue Loss begin (A)	Yellow Loss Begin (A)	Orbit Angle w.r.t. axis (mrad)
IR8	146.66	35.10	97		1.45
				98 →	1.42
IR6	148.37	36.69	98		1.47
				101 →	1.38
IR2	148.87	37.12	93		1.62
				97 →	1.51

- Assuming at injection: Emit = 12 Pi.
- Beta_x at DX exit is: 10+13.5*13.5/10 = 28.225 1 sigma beam size at DX exit is: 1 sigma = 2.4 mm
- Beam center at 20.14 from the beam pipe wall at DX: **20.14 / 2.4 = 8.4 sigma**

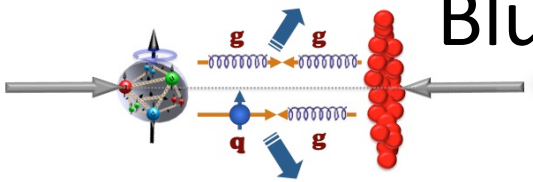
Yellow Beam Trajectory at IP6 Injection

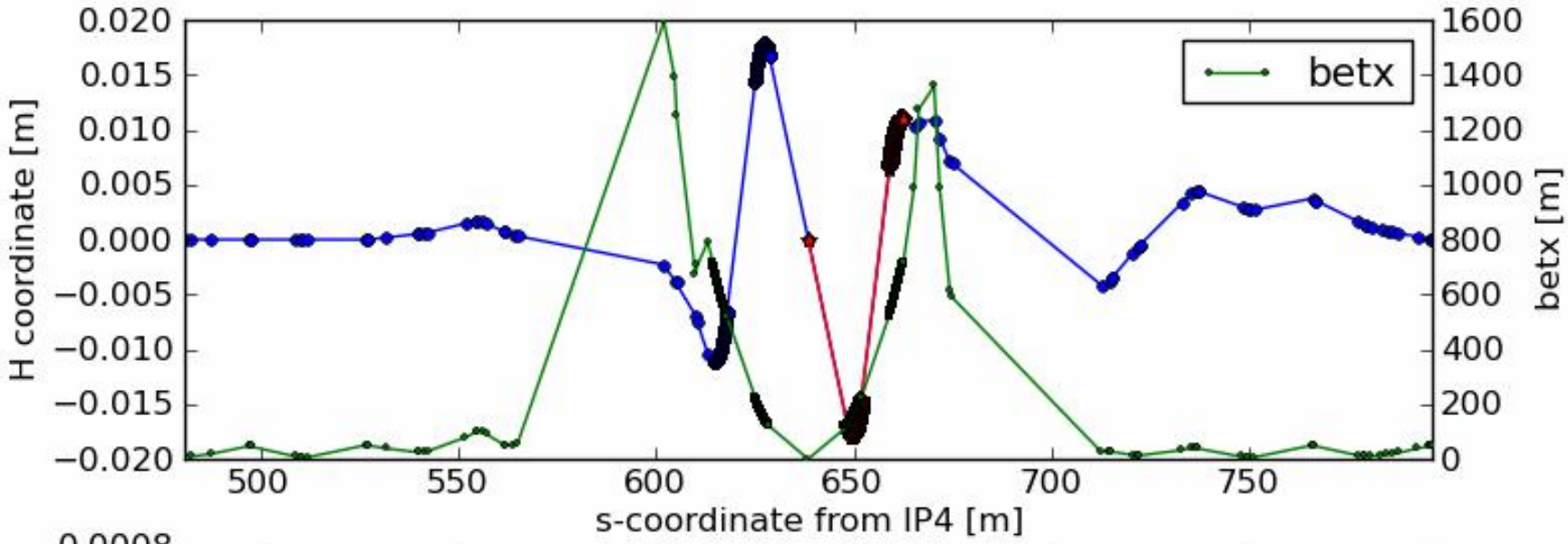


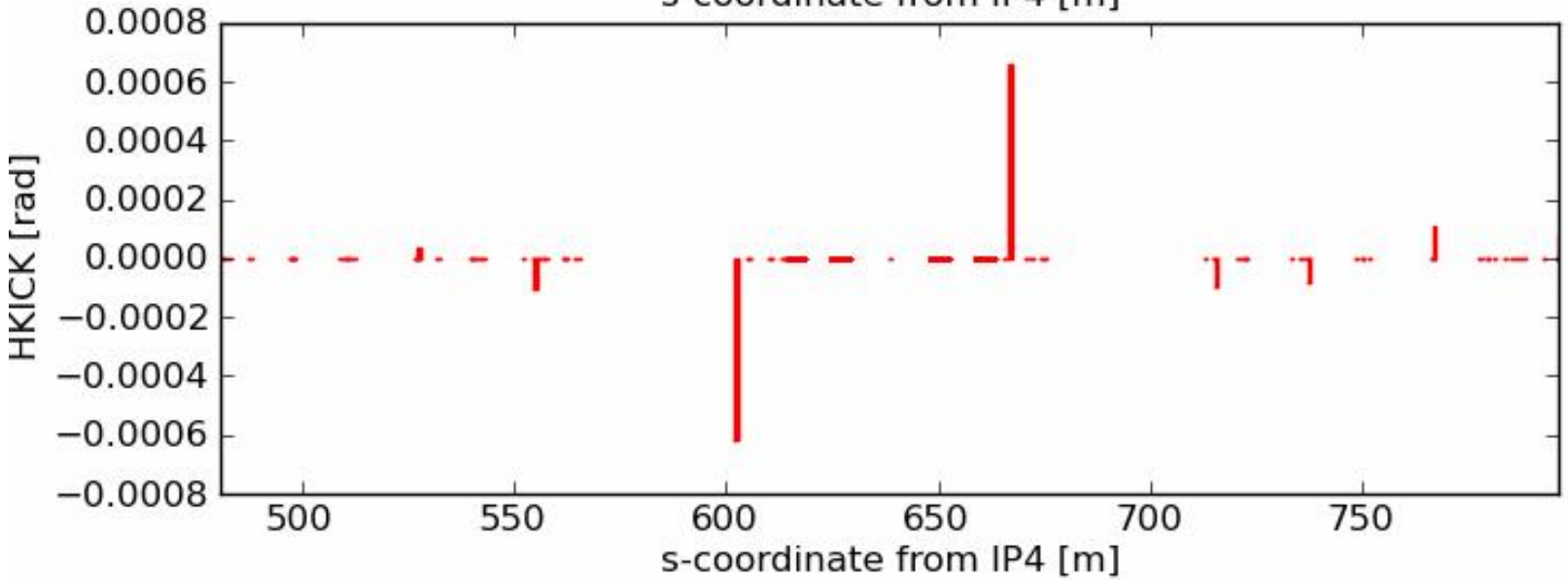




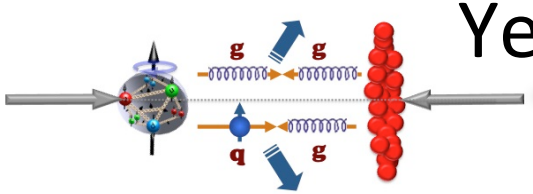
Blue Beam Trajectory at IP6 Injection

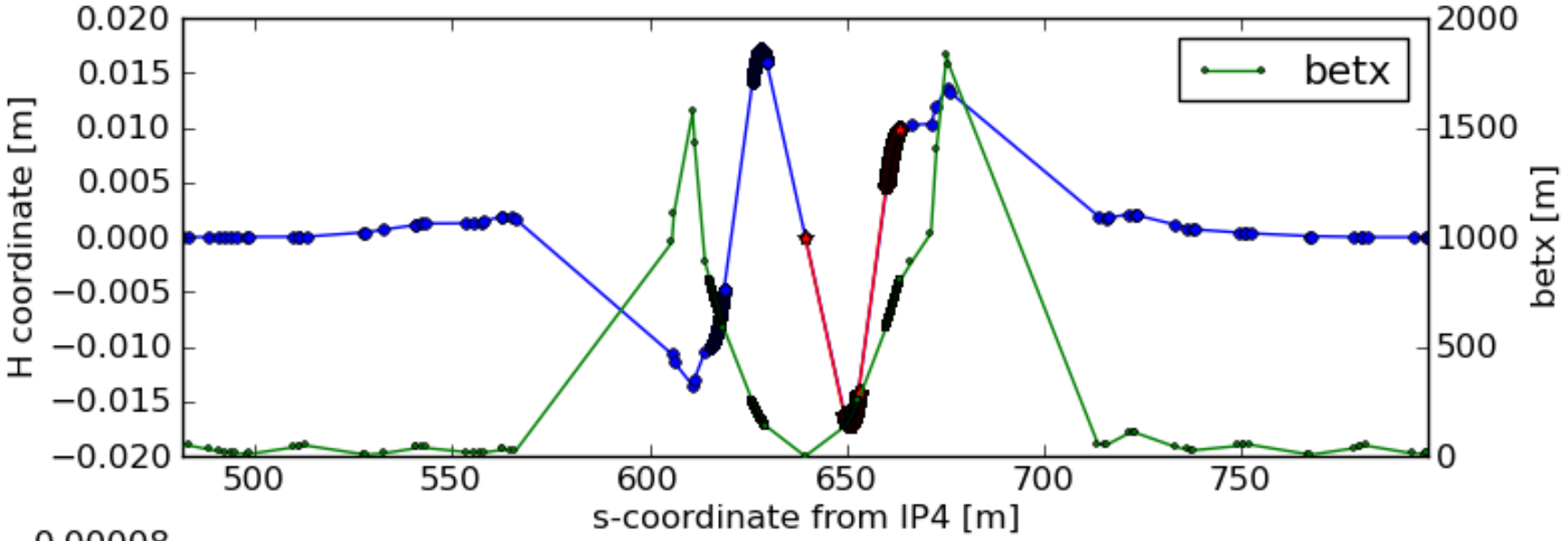


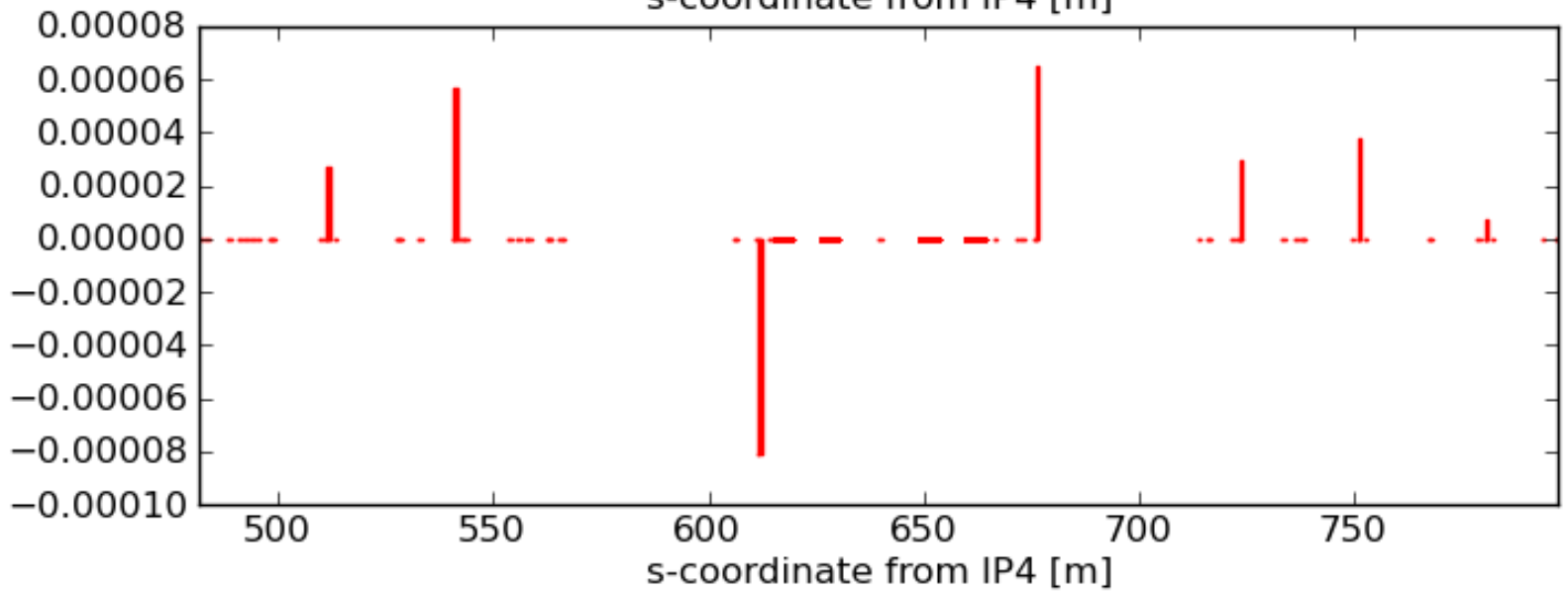


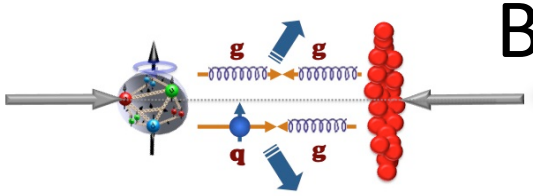


Yellow Beam Trajectory at IP6 Store

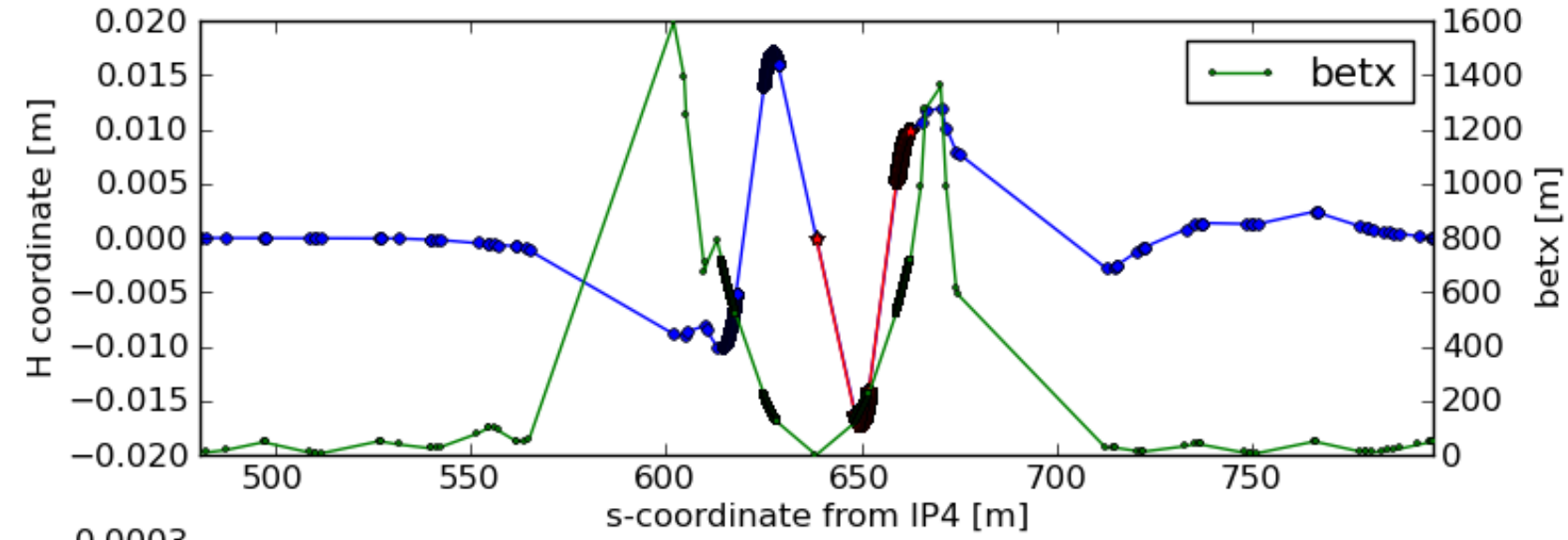


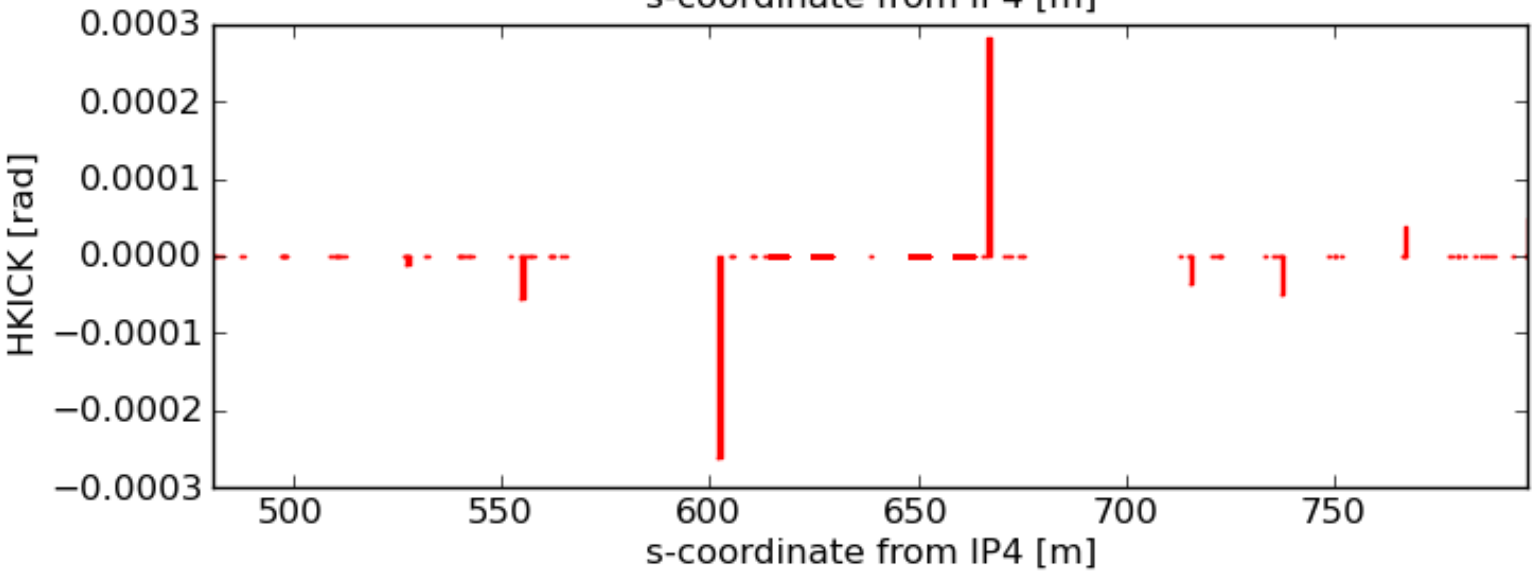


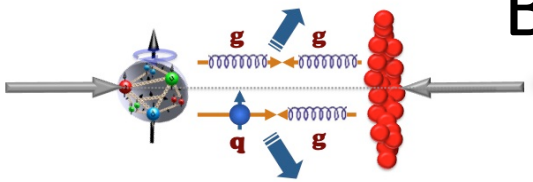




Blue Beam Trajectory at IP6 Store



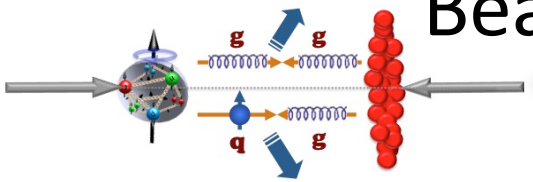




Beam Trajectory at colliding IP

	gamma	Beta-gamma	Emitx [mm-mrad]	Beta* [m]	Space DX [sigma]	Space D0 [sigma]
He3	**11.154**	11.109	12	7.5	20.1	8.3
	112.955	111.406	15	1.0	23.7	9.4
Au	**11.149**	11.108	12	7.5	8.05	8.30
	107.396	107.391	15	1.0	9.53	9.18

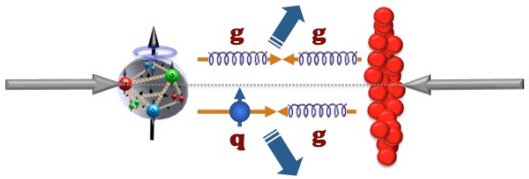
1. Aperture of DX pipe = 68.68mm, as in Yun's calculation
2. Two injection scenarios both w same frequency
3. Assuming 5mm V separation bumps at all IPs at injection, and no-colliding IPs at store



Beam Trajectory at non-colliding IP

	gamma	Beta-gamma	Emitx [mm-mrad]	Beta* [m]	Space DX [sigma]	Space D0 [sigma]
He3	**11.154**	11.109	12	7.5	20.1	8.3
	112.955	111.406	15	7.5	57.0	24.4
Au	**11.149**	11.108	12	7.5	8.05	8.30
	107.396	107.391	15	7.5	22.88	23.82

1. Aperture of DX pipe = 68.68mm, as in Yun's calculation
2. Two injection scenarios both w same frequency
3. Assuming 5mm V separation bumps at all IPs at injection, and no-colliding IPs at store



APEX Plan

- At injection, implement the trajectory at IP6 in Yellow
  - Confirm that one can generate such local bump with stored beam
  - Exam that we can inject in this condition
  - exam the beam losses and beam lifetime. Measure DA if possible
  - Estimate 2 hour of APEX time

- If successful with the above, then need to repeat at store in Yellow
  - Needs to develop the ramp
  - Measure DA