New Multi-OTR system

M. Alabau Pons, J. Alabau Gonzalvo, A. Faus-Golfe
(IFIC-Valencia)

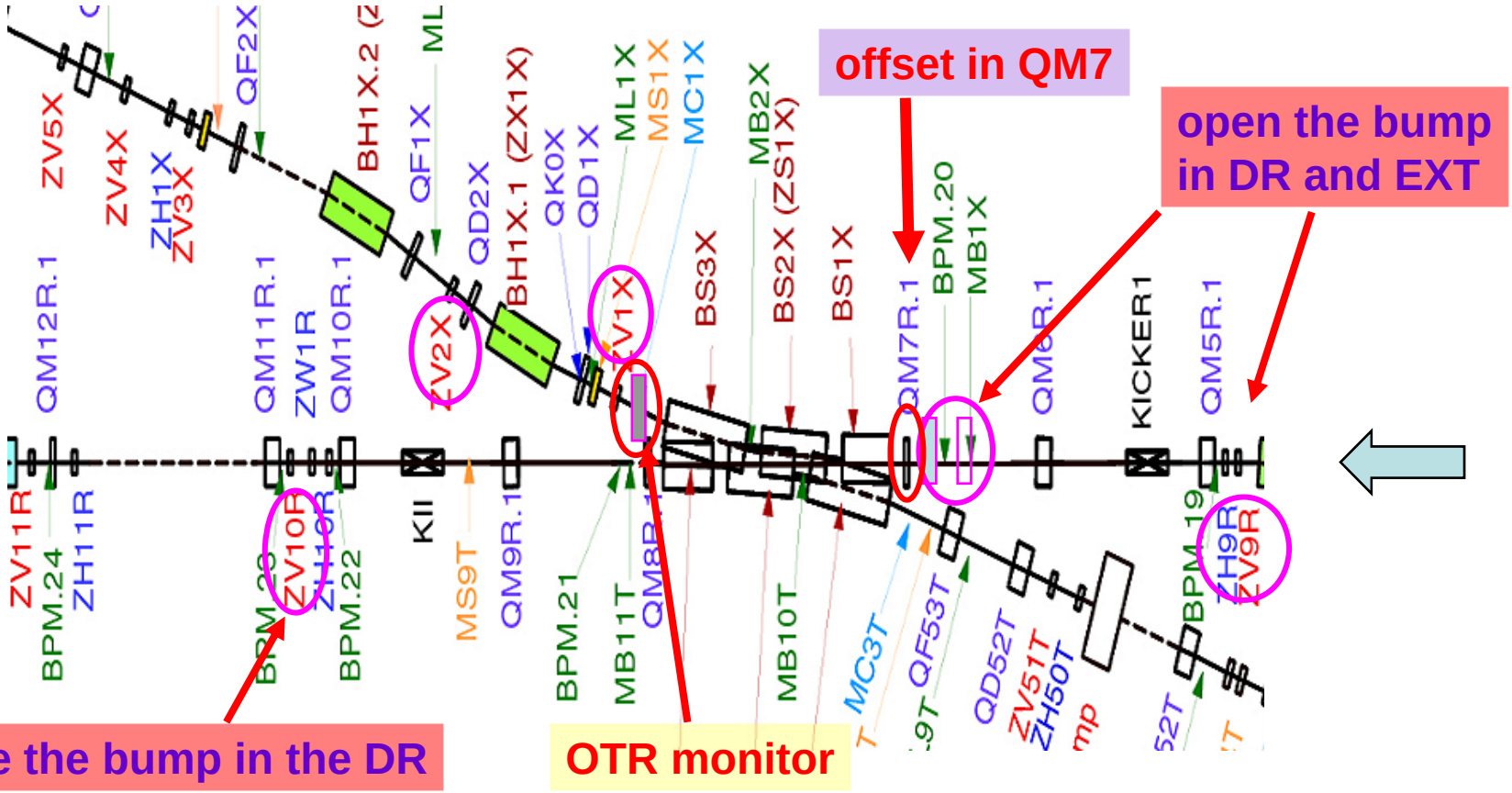
Experimental Proposal: Measurements with OTR1X

Beam size after the shared magnets is correlated with the emittance:

- OTR1X monitor installed in EXT line images the beam angular spread out of QM7

- Creating bumps in QM7 to probe effects on the vertical emittance

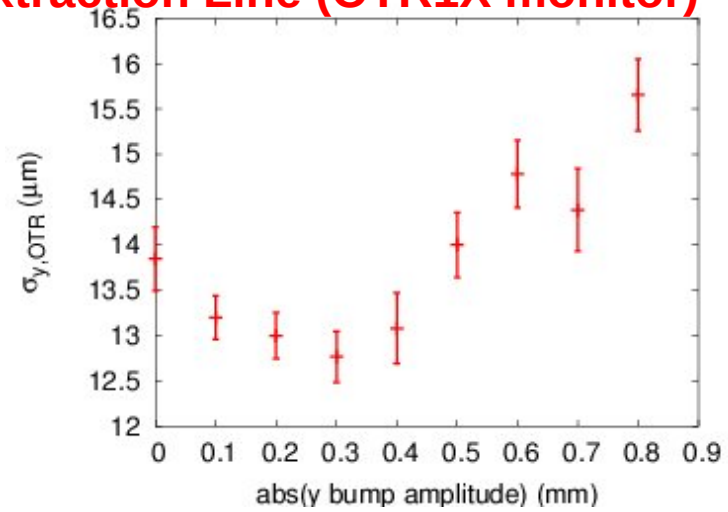
-Measure beam sizes at the DR (XSR monitor) and the EXT line (OTR monitor) as a function of the bump amplitude



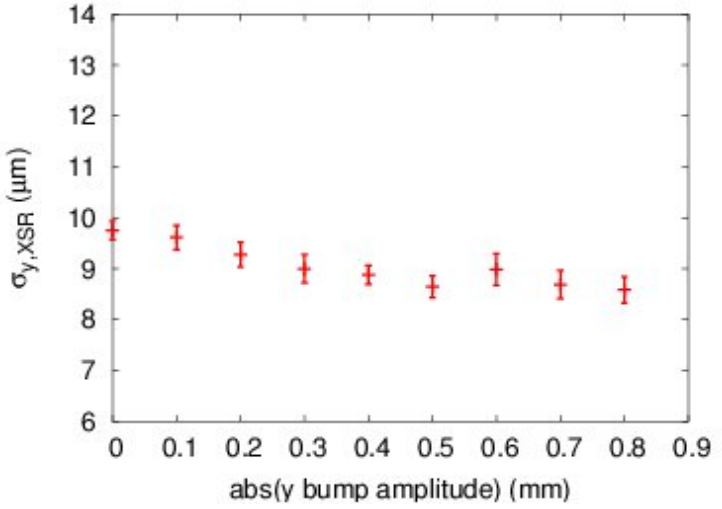
ATF: Measurements on 19th Dec'07

Measured *y* beam size *vs y* bump amplitude at QM7

Extraction Line (OTR1X monitor)



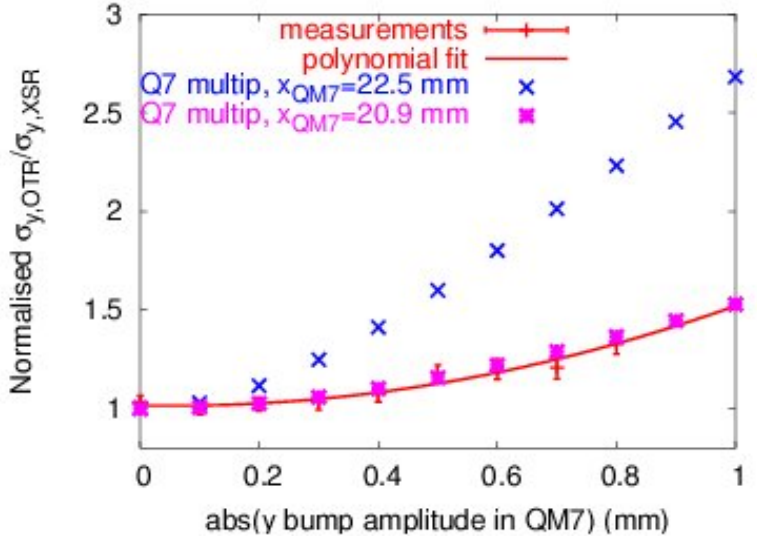
Damping Ring (XSR monitor)



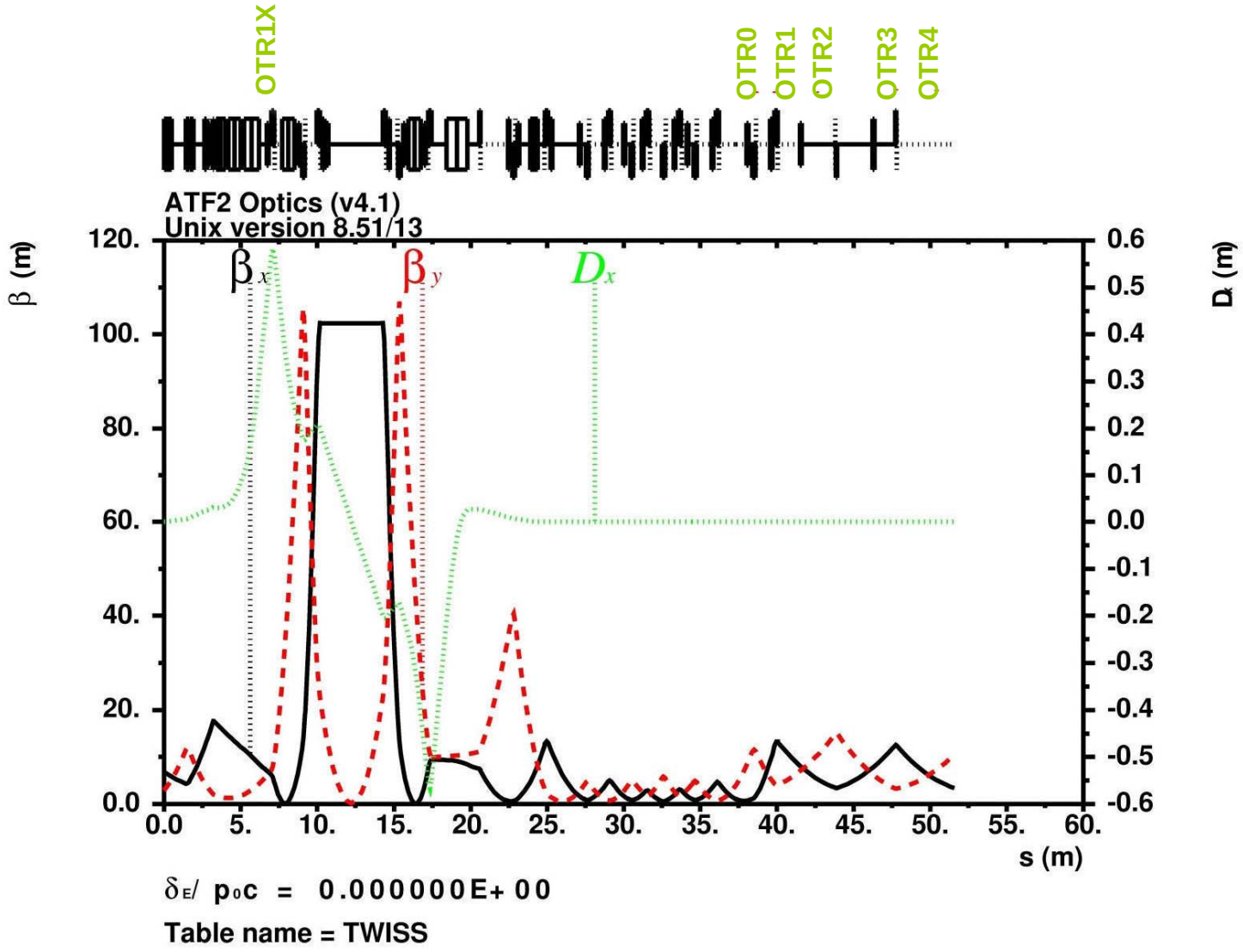
OTR *vs* XSR (measurements and simulations)

Simulations:
- **including non-linear fields in QM7**
- **for different horizontal bump amplitudes in QM7 (nominal extraction 22.5 mm)**
- **with input DR emittances:**

ε_y=36 pm ~ 3*$\varepsilon_{y,nom}$
ε_x=2.4 nm ~ 2*$\varepsilon_{x,nom}$



V4.1 Optics and draft location for the new OTR's

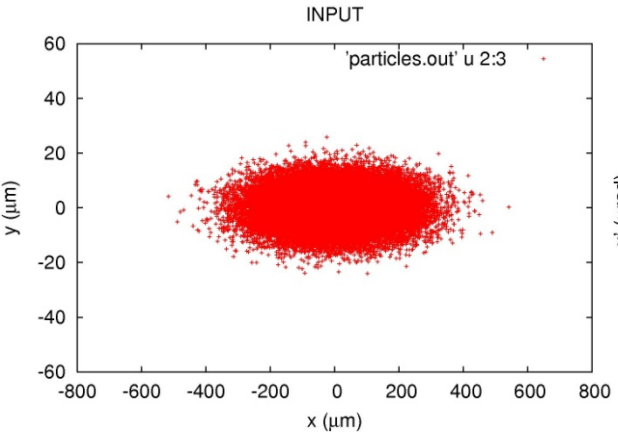


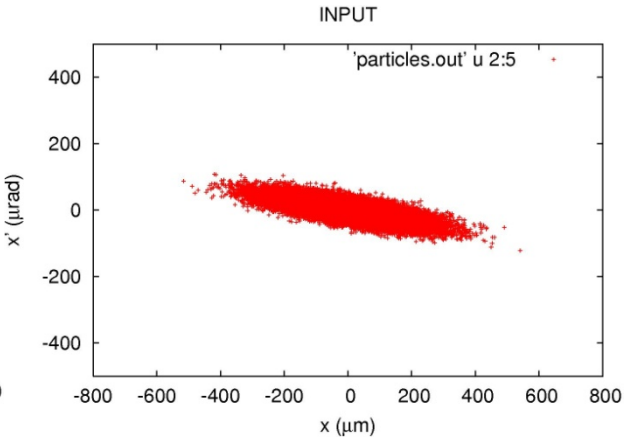
	OTR1X_old	S_EXT	OTR1X	OTRW0	OTRW1	OTRW2	OTRW3	OTRW4
β_x[m]	9,736	6,853	7,392	3,282	12,122	3,824	11,412	3,758
β_y [m]	5,514	2,941	5,617	9,271	4,496	13,790	3,527	9,702
α_x	1,898	1,112	1,445	-3,166	1,904	0,678	1,779	0,609
α_y	-1,890	-1,911	-1,807	3,187	-0,838	-2,054	-0,426	-1,500
D_x [m]	3,75E-01	0,00	4,36E-01	7,70E-09	1,42E-08	5,88E-09	3,63E-10	-3,87E-09
D_y [m]	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
σ_x [μm]	323,72	117,07	369,11	81,02	155,71	87,45	151,08	86,69
σ_y [μm]	9,09	5,89	8,14	10,46	7,28	12,75	6,45	10,70
μ_x	0,097	0,000	0,122	2,875	2,905	2,983	3,103	3,184
Δ(μ_x)			0,122	2,752	0,030	0,078	0,120	0,081
μ_y	0,372	0,000	0,366	2,142	2,184	2,251	2,363	2,455
Δ(μ_y)			0,366	1,775	0,042	0,067	0,112	0,092

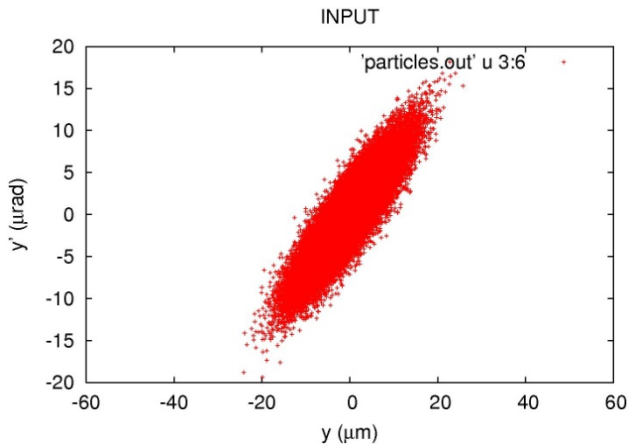
Є_x [m.rad]	1,50E-09	2,00E-09
Є_y[m.rad]	1,50E-11	1,18E-11
σ_E	8,00E-04	
E (GeV)	1,3	

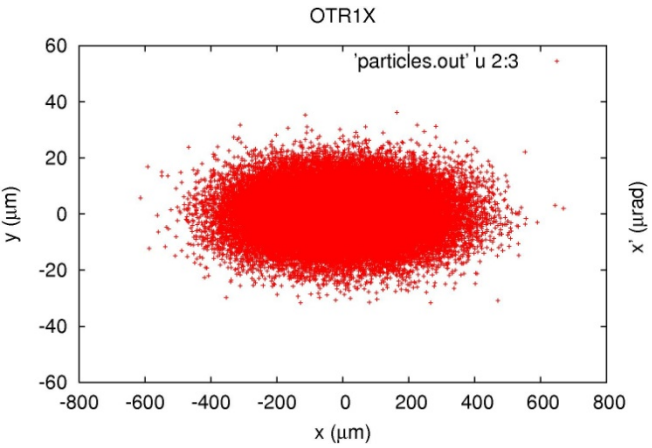
V4.1 Beam sizes by Tracking

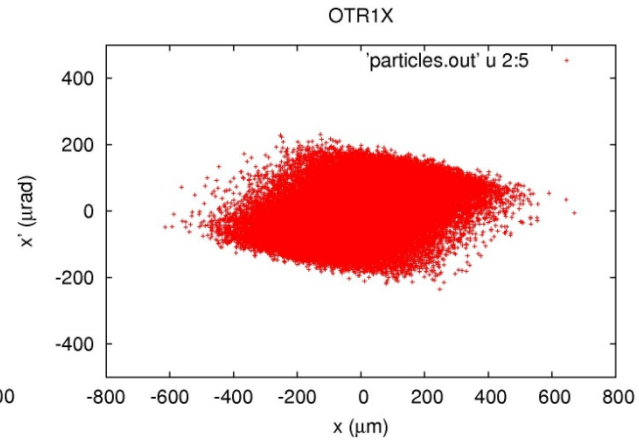
Tracking using PLACET/MAD:
- 50.000 particles,
- x and y gaussian distribution
- energy rectangular distribution

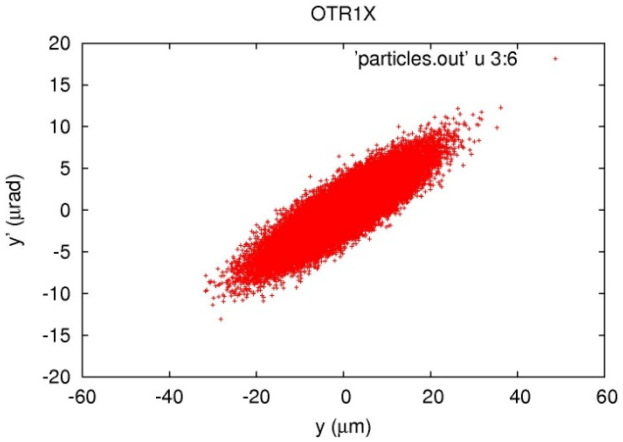


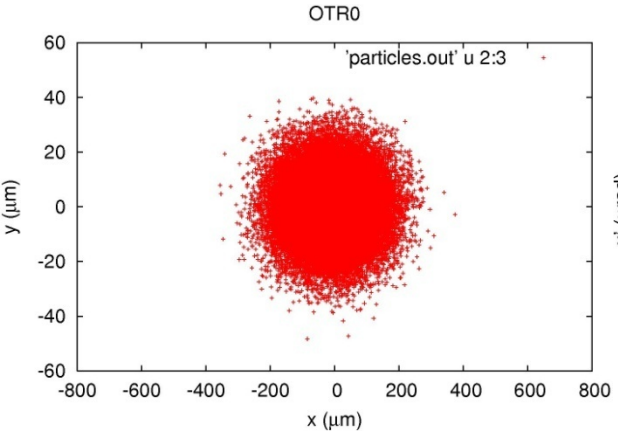


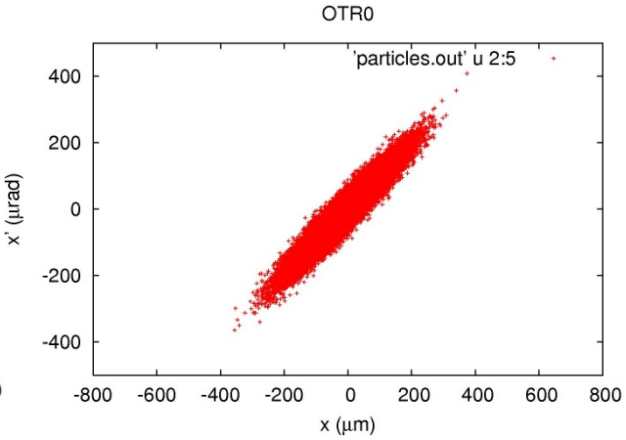


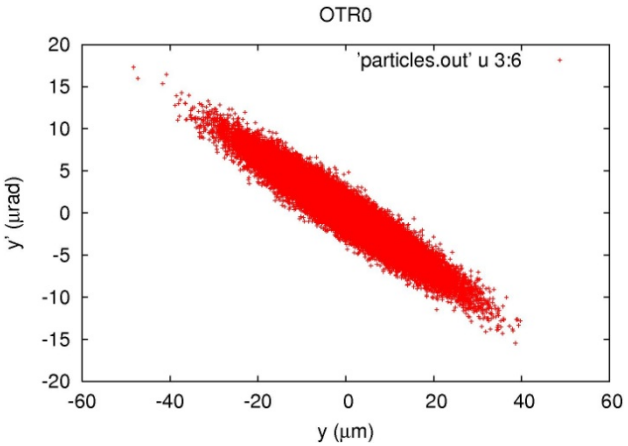


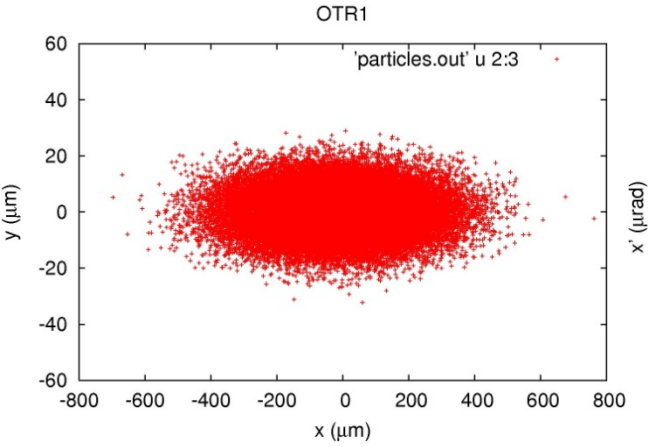


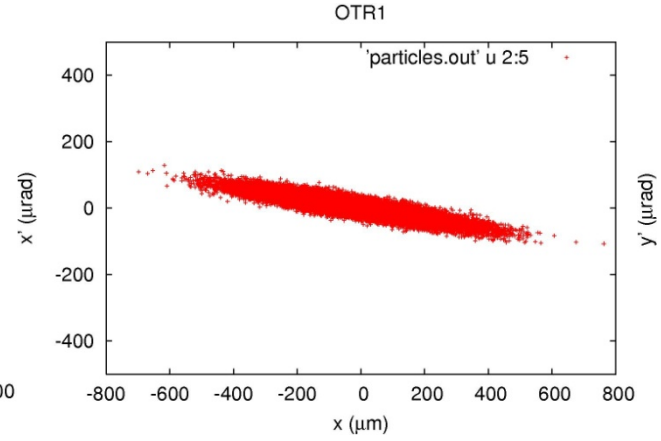


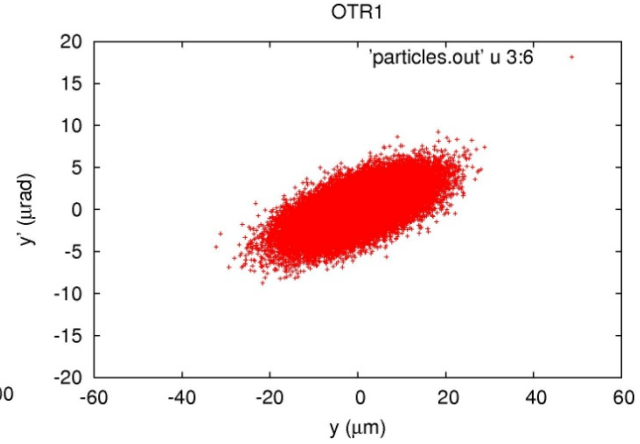

OTR0
'particles.out' u 2:3
y (µm)
x (µm)

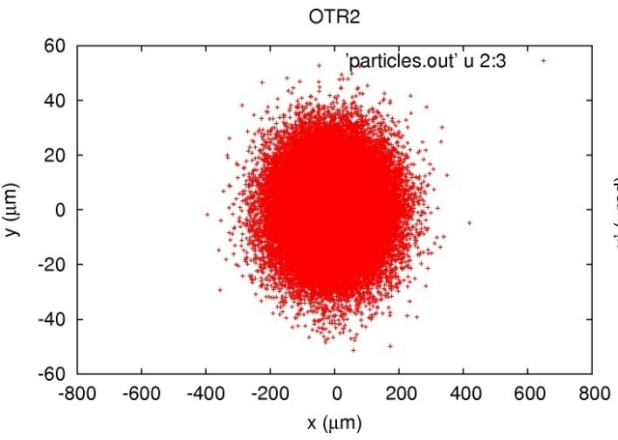

OTR0
'particles.out' u 2:5
x' (µrad)
x (µm)

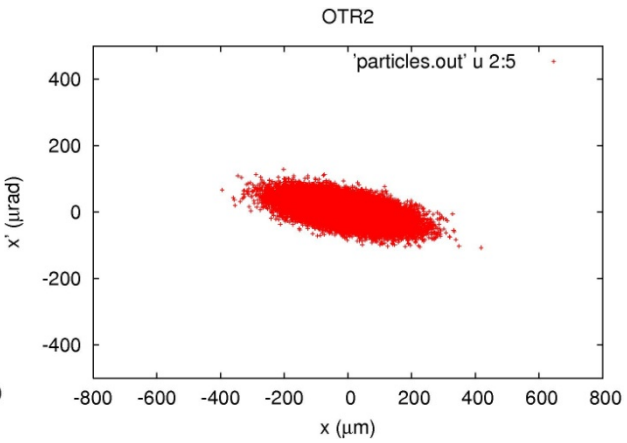

OTR0
'particles.out' u 3:6
y' (µrad)
y (µm)

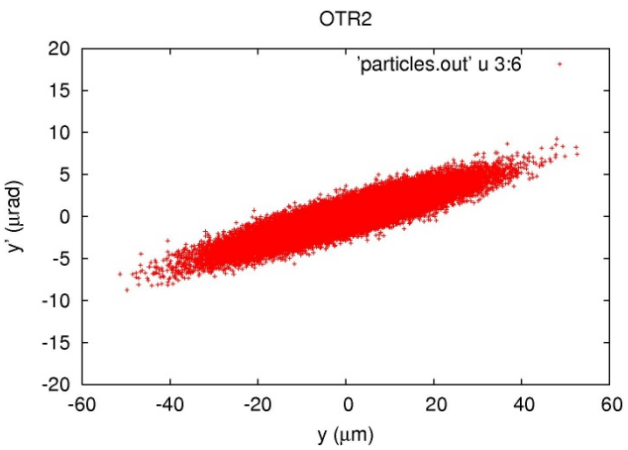

OTR1
'particles.out' u 2:3
y (µm)
x (µm)

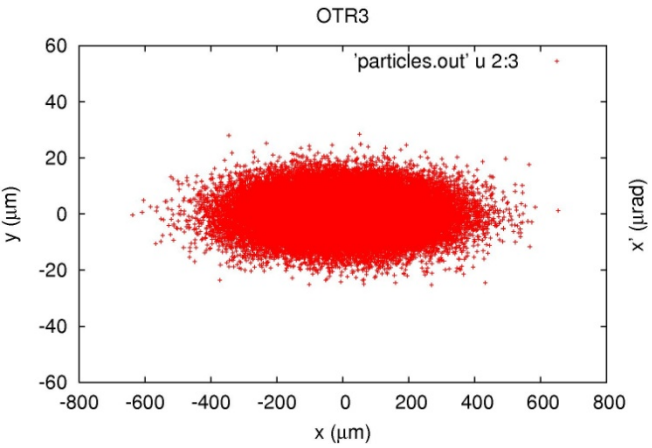

OTR1
'particles.out' u 2:5
x' (µrad)
x (µm)

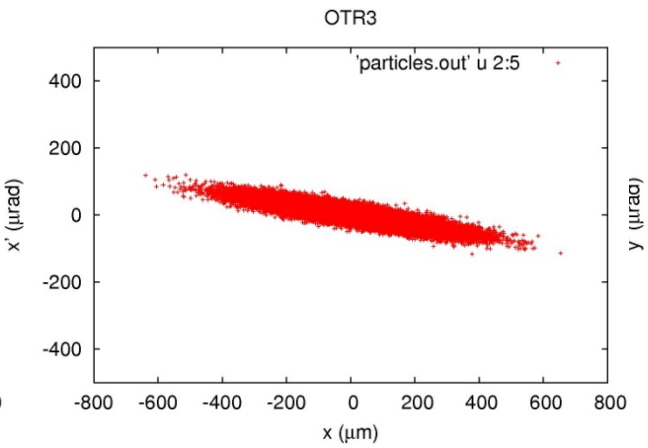

OTR1
'particles.out' u 3:6
y' (µrad)
y (µm)

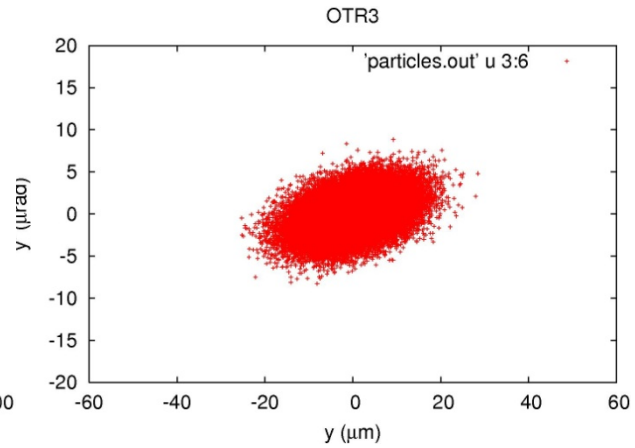

OTR2
'particles.out' u 2:3
y (µm)
x (µm)

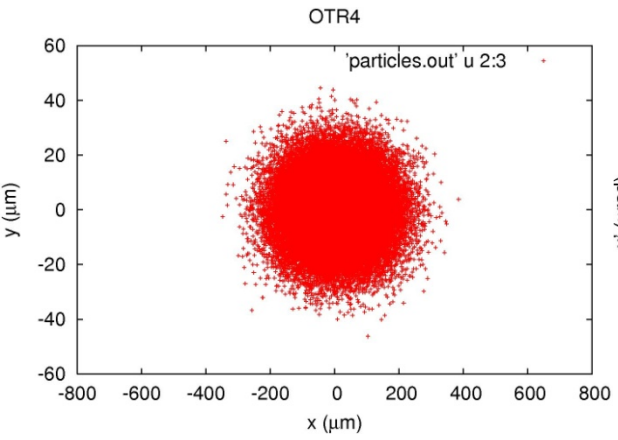

OTR2
'particles.out' u 2:5
x' (µrad)
x (µm)

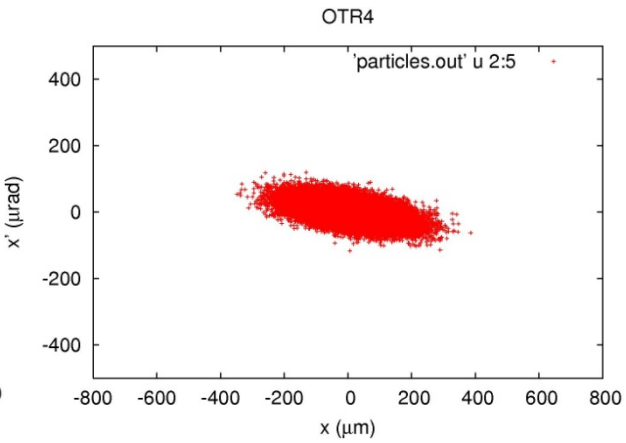

OTR2
'particles.out' u 3:6
y' (µrad)
y (µm)

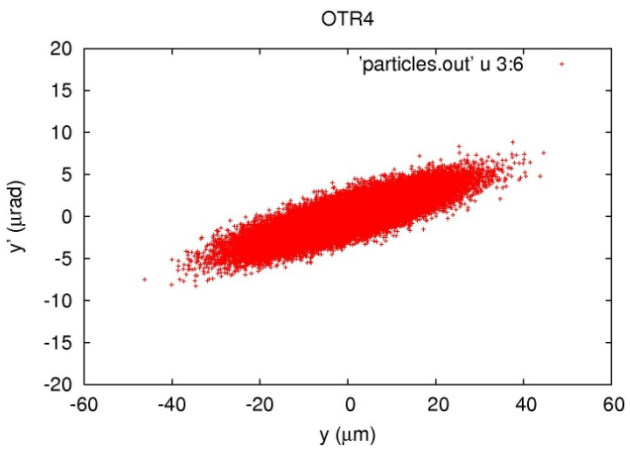

OTR3
'particles.out' u 2:3
y (µm)
x (µm)


OTR3
'particles.out' u 2:5
x' (µrad)
x (µm)


OTR3
'particles.out' u 3:6
y (µrad)
y (µm)


OTR4
'particles.out' u 2:3
y (μm)
x (μm)
60
40
20
0
-20
-40
-60
-800
-600
-400
-200
0
200
400
600
800


OTR4
'particles.out' u 2:5
x' (μrad)
x (μm)
400
200
0
-200
-400
-800
-600
-400
-200
0
200
400
600
800


OTR4
'particles.out' u 3:6
y' (μrad)
y (μm)
20
15
10
5
0
-5
-10
-15
-20
-60
-40
-20
0
20
40
60