F04
Maximum peaking by impurity injection

FTU Experimental Campaign C1-B

Wednesday 29/10/2019 (Late)

C. Mazzotta, G. Pucella

RdO: S. Ceccuzzi, C. DiTroia
PiC: M.Marinucci, C.Castaldo

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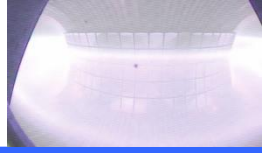
Ricerca Formazione Innovazione

F04 – Impurity Injection



Goals

The main aims of this experiment are :

- Understand the transport mechanism that leads to spontaneous density peaking when plasma is doped by medium heavy impurities: Neon and Helium.
- Characterization of doped plasma in order to set the parametric dependence in: q, line density, peaking, collisionality, amount of impurity and species.
- Achieve a well high peaking, up to the highest value reaching with doped experiment in MST.
- Explore current dependency (and edge temperature)
- Deepen the behaviour oh heated doped profiles in order to understand the role of the edge temperature

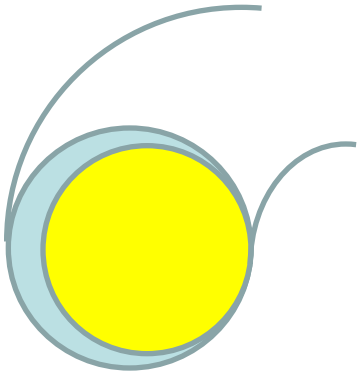
Scenario

- **Explore the recycling effect**
- Current scan Ip = 250 - 500 kA :
- Starting density scan n_e= 0.3 – 0.6

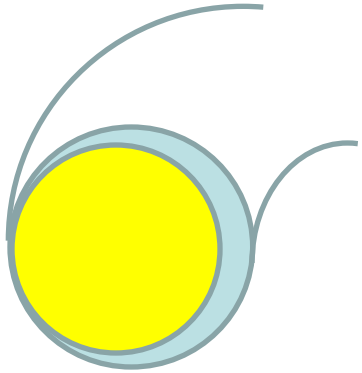
F04 – Impurity Injection

Pulse Plan

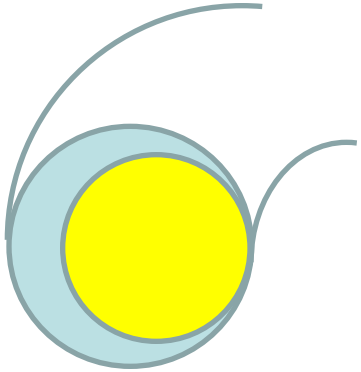
1.	Repeat #42723 5.3 T, 250 kA, n_{e0}=0.3 with He V=120 dp=25 but with t_{inj}=0.7s
2.	As above but with plasma shifted of 1 cm to the LFS (see figure below)
3.	As **1.** but with plasma radius reduced of 2 cm Choose from above the best peaking obtained between 1.,2. and 3. and continue
4.	Repeat but with n_{e0}=0.6 and He t_{inj}=0.7s
5.	Repeat but with n_{e0}=0.6 and He t_{inj}=0.5s (0.4 s eventually)
6.	Current scan: as **5.** but I_p = 360 kA
7.	As above but I_p = 500 kA
8.	Reference discharge: repeat **5.** or **6.** without impurity injection, realizing the density increase with deuterium puffing alone



1.

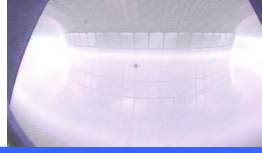


2.



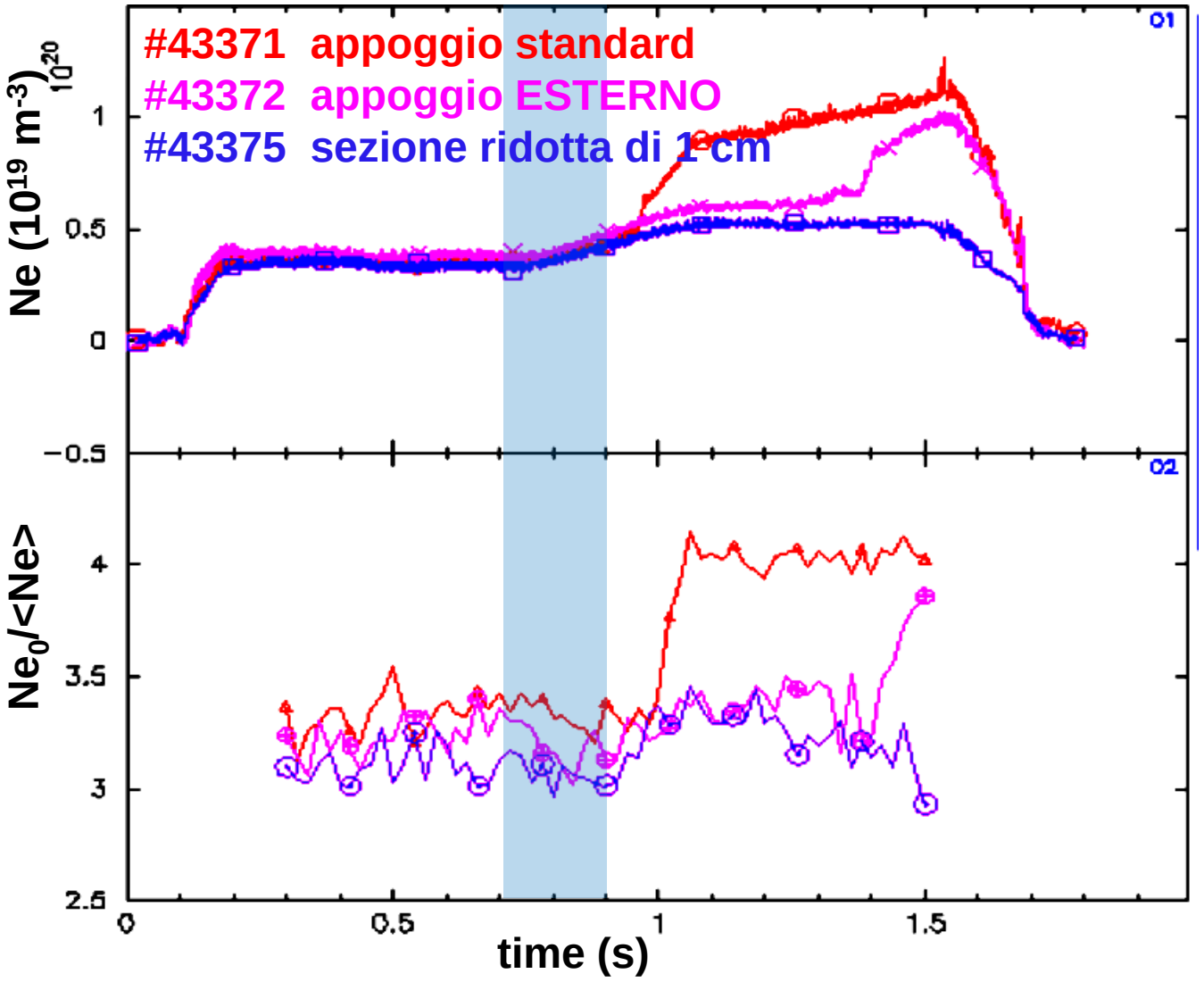
3.

Experimental session

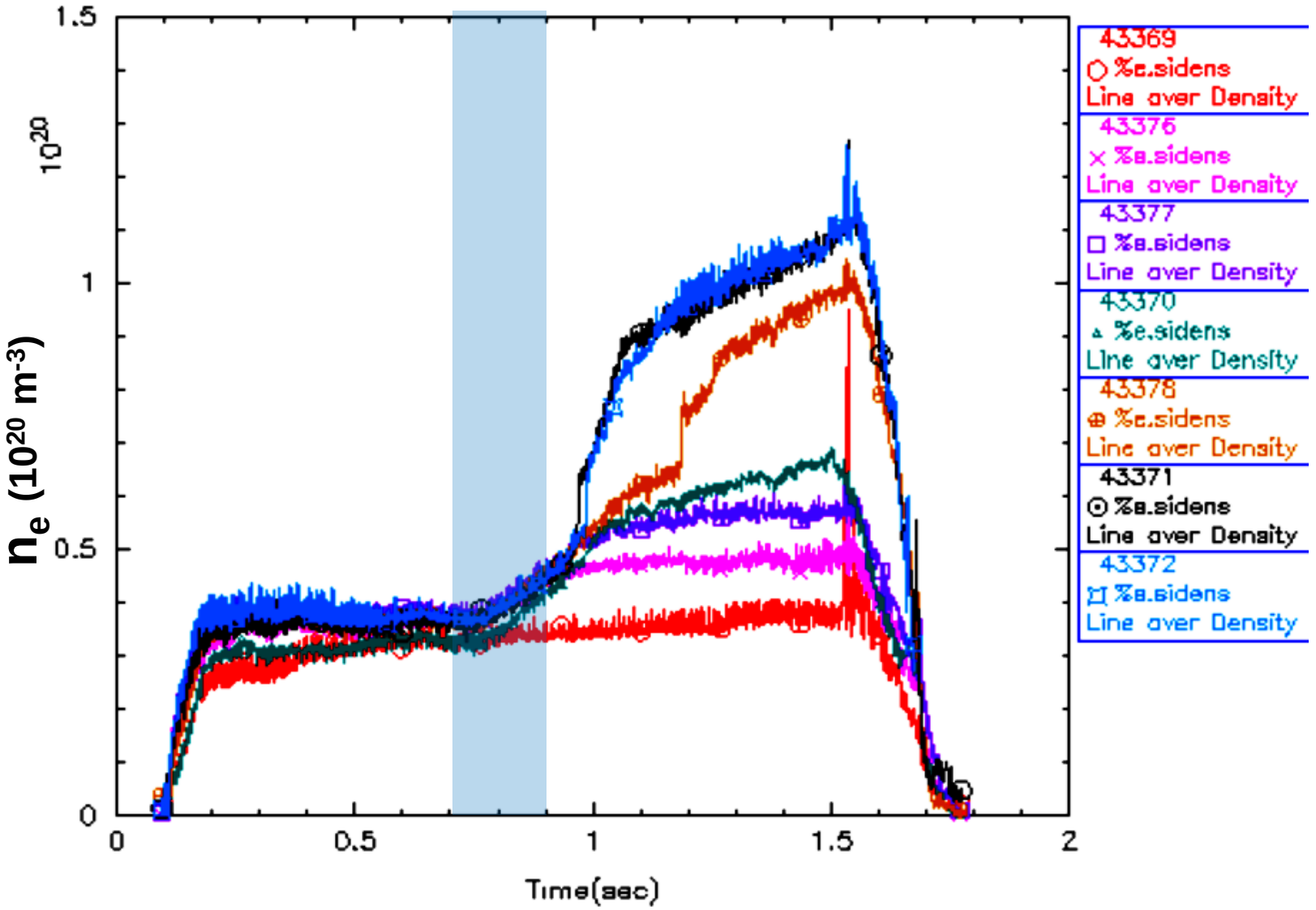


Pulse	Time	B (T)	Ip (MA)	Te* (keV) (*)	n20 (m-3) (*)	He t-V-dp (s-V-mb)	Zeff(t1) - Zeff(t2) (**)	Ha(t2) e19mk s (***)	N20 max	Comments
43366	12:09									prova impianti
43367	12:21									sparo di zero
43368	12:42	5.3	0.5	1.47						sparo standard
43369	12:51	5.5	0.27	1.44	0.35			2		come 42723, ma con asse magn. 2 cm piu interno
43270	13:11	5.5	0.27	1.44	0.33	0.7-120-25	3.3(.7)-3.8(1.).	2	0.65	interferometro disallineato – da ripetere senza il tilt
43371	14:07	5.5	0.27	1.45	0.35	0.7-120-25	4(.7)-7.6(1.2)	2	0.96	scarica anomala per ingresso di matreriale alto zeta, da ripetere
43372	15:05	5.5	0.27	1.45	0.36	0.7-120-25	3.5(.7)-7.6(1.2)	2	1.1	l'anomalia si ripresenta identica
43373	15:23	5.5								sparo di zero a 5.5 tesla
43374	15:40	5.5	0.27	1.36	0.31	0.7-120-25	3.6(.7)-3.1(1.2)	2	1.0	appoggio esterno
43375	15:57	5.5	0.27	1.62	0.33	0.7-120-25	4.1(.7)-3.5(1.2)	2.8	0.52	terza config. di plasma
43376	16:18	5.5	0.27	1.43	0.35	0.7-120-15	4.4(.7)-3.3(1.2)	1.9	0.46	configurazione standard (no anomalia)
43377	16:33	5.5	0.27	1.45	0.38	0.7-120-20	4.5(.7)-3.7(1.2)	1.9	0.56	come la precedente
43378	16:49	5.5	0.27	1.40	0.36	0.7-120-25	3.8(.7)-7.9(1.4)	2	0.93	Come la precedente (anomalia a ~1.18 s)
43379	17:01	5.5	0.27	1.40	0.37	0.4-120-25	4.4(.4)-7.7(1.4)	2	0.92	configurazione standard (anomalia a ~1.18 s)
43380	17:19	5.5	0.27	1.08	0.55	0.7-120-25	2.5(.7)-2.6(1.2)	4	1.30	H-alpha satura dopo 1.1 s, density overshoot Transiz. ciclo limite -> modo di grande ampiezza
43381	17:34	5.5	0.27	0.9	0.90	0.7-120-25	3.8(.7)-2.8(1.0)	4	1.30	H-alpha satura a 1.0 s. No density overshoot.
43382	17.48	5.5	0.27	0.9	0.94	0.7-120-25	3.5(.7)-2.0(1.0)	4	1.30	H-alpha bursts + saturazione a ~1.0 s.
43383	18.08	5.5								Only breakdown
43384	18:21	5.5	0.37	0.97	0.99	0.7-120-25	1.0(.7)-1.1(0.9)	15	1.15	Disruzione 1.09s H-alpha saturazione a 0.5 s
43385	18:43									Arresto sequenza

Helium amount scan



Helium amount scan



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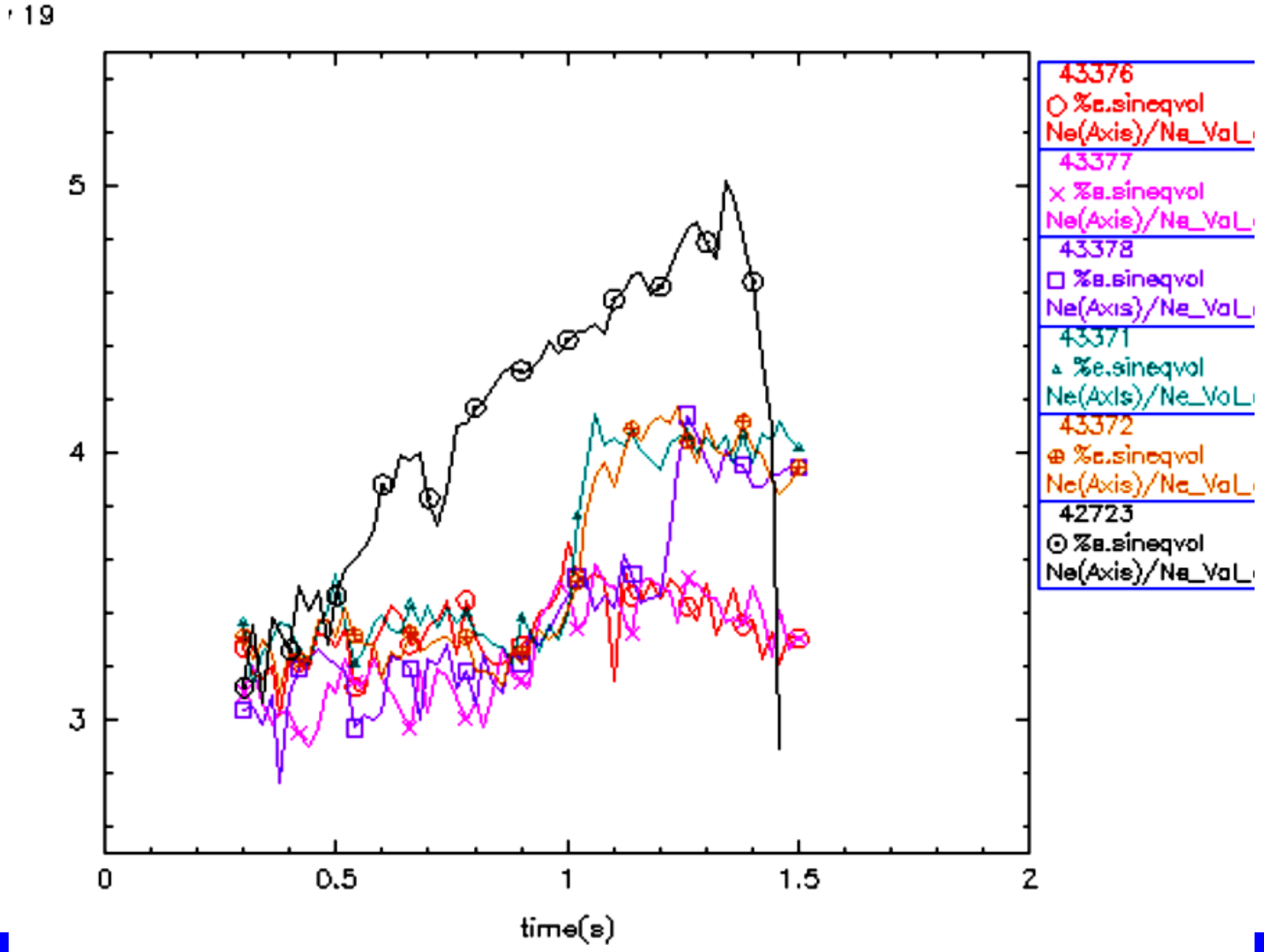
Peaking


19
5
4
3
0
0.5
1
1.5
2
time(s)
43376
%e.sineqvol
Ne(Axis)/Ne_Vol_
43377
%e.sineqvol
Ne(Axis)/Ne_Vol_
43378
%e.sineqvol
Ne(Axis)/Ne_Vol_
43371
%e.sineqvol
Ne(Axis)/Ne_Vol_
43372
%e.sineqvol
Ne(Axis)/Ne_Vol_
42723
%e.sineqvol
Ne(Axis)/Ne_Vol_