

EC Assisted Breakdown

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&

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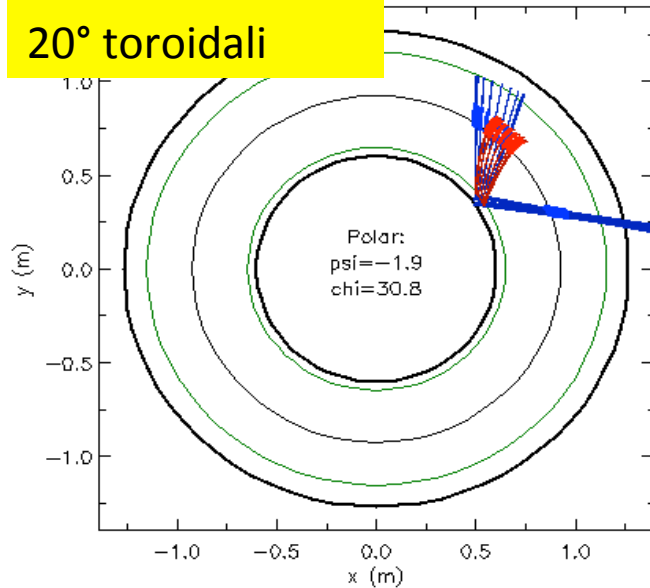
Objectives for IAEA abstract

- To demonstrate the **polarization conversion** at inner wall in case of oblique injection;
- to **validate the BKD0 code** simulations applied to FTU at lower pressure, and high EC power level (800kW) filling the existing FTU database;
- to study the effect of EC power in case **of high vertical stray field**;
- To compare **X2 vs O1 effectiveness** of EC assisted breakdown (ITER initial strategy).

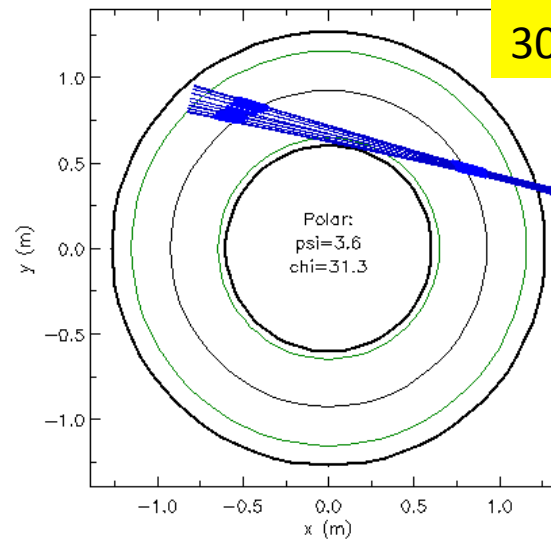
Mode Conversion at inner bounce

2 co+2 cnt shots at 5.3T 20°

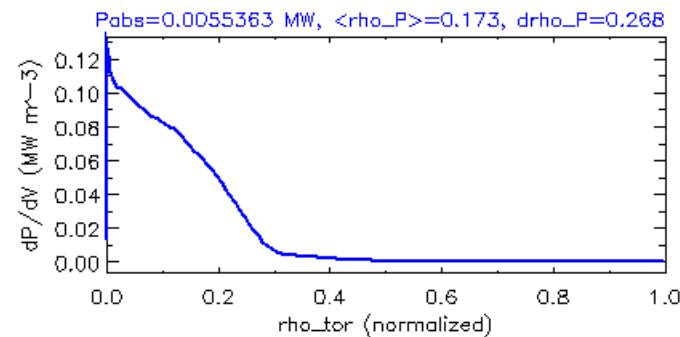
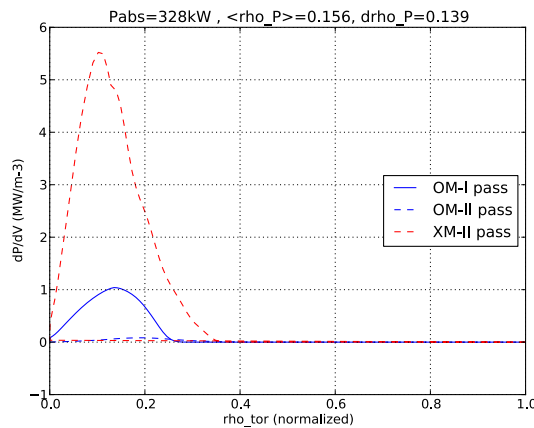
20° toroidali



30° toroidali

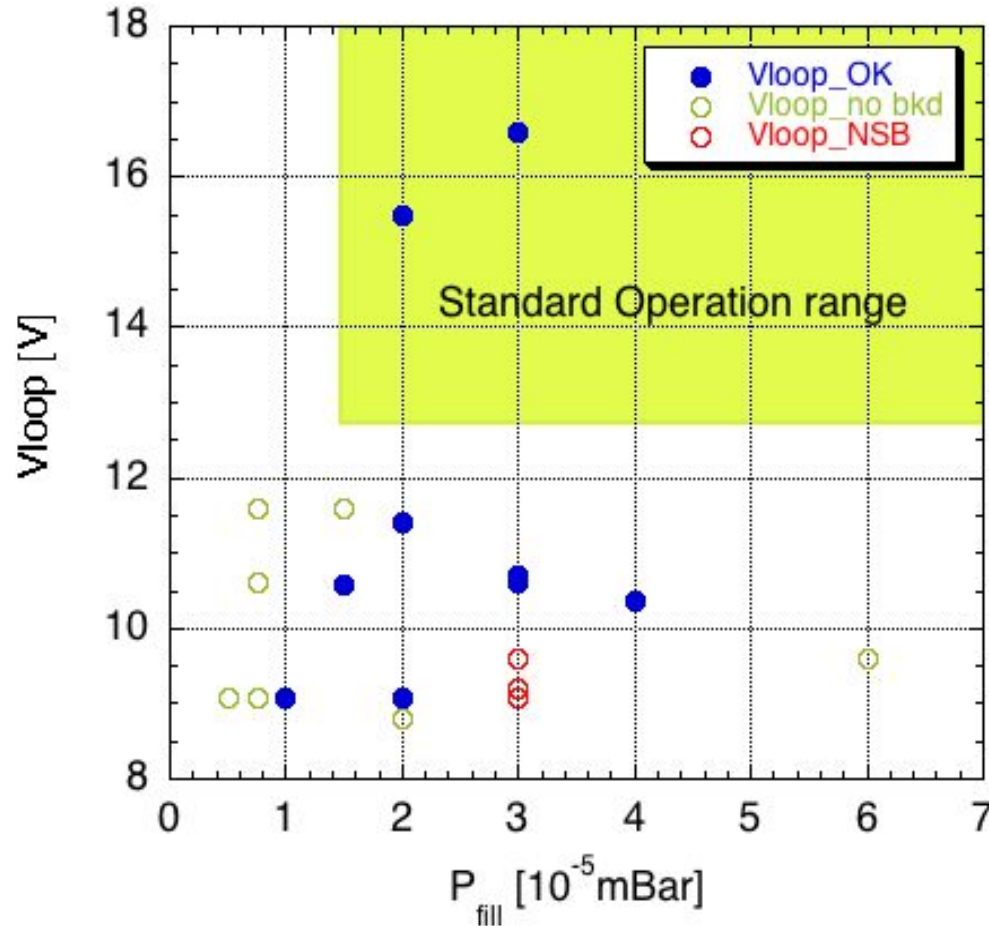


A 30° non c'è rimbalzo interno e quindi efficiente conversione -> minore assorbimento



A 20° l'assorbimento è dovuto al modo X (in rosso), come risultato della conversione con angolo di incidenza obliqua

Effect of EC on SB region on FTU



To test the low pressure and high pressure limit

To evaluate effect of power (400-800 kW)

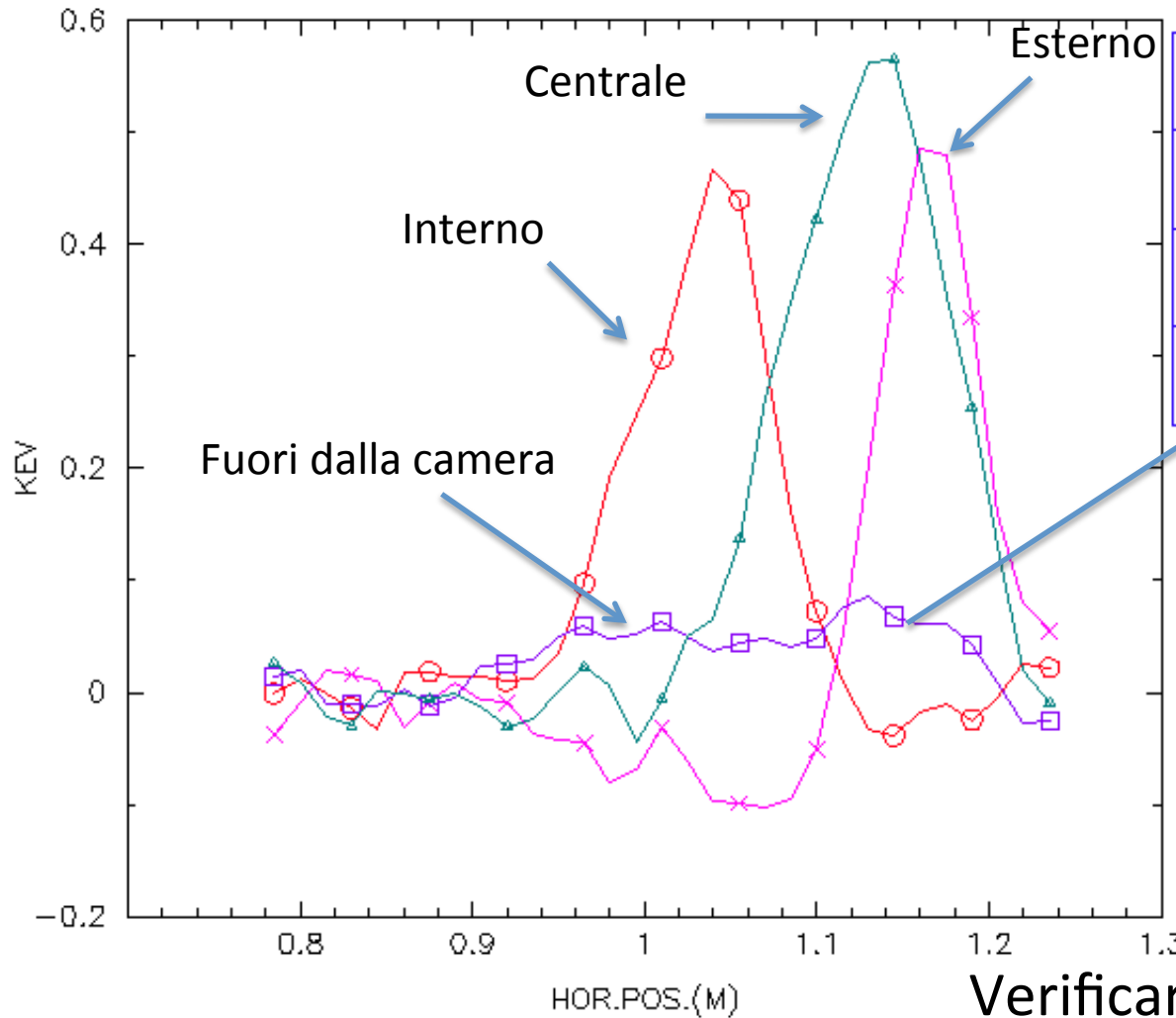
At moderate $V_{loop} = 9V$

Data at 2.5 T

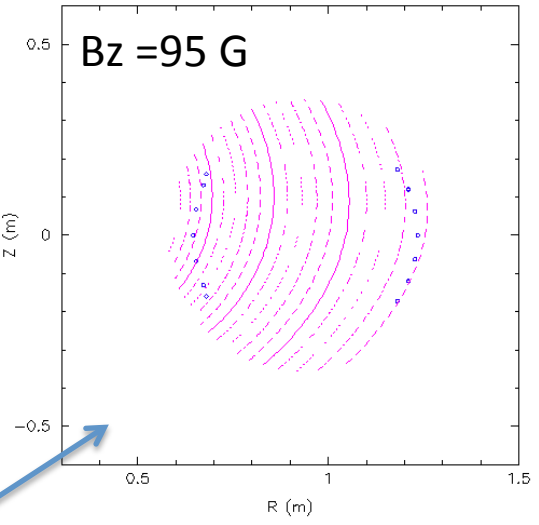
5 shot at 2.5T/5.3T 20°

Verticale Stray in Ohmico

FTU Shot 36085 Time = 0.000 s



- 36076
○ %e.ecmtvr(
T-ECE 0.022
- 36082
× %e.ecmtvr(
T-ECE 0.020
- 36085
□ %e.ecmtvr(
T-ECE 0.019
- 36088
△ %e.ecmtvr(0.025)
T-ECE 0.025S-DT0.C



Il profilo di T_e (a 20ms) segue l'andamento del nullo

Quando il nullo è fuori dalla camera ($I_v > 250A$) il profilo di T_e è allargato è + basso, ma la scarica parte ugualmente

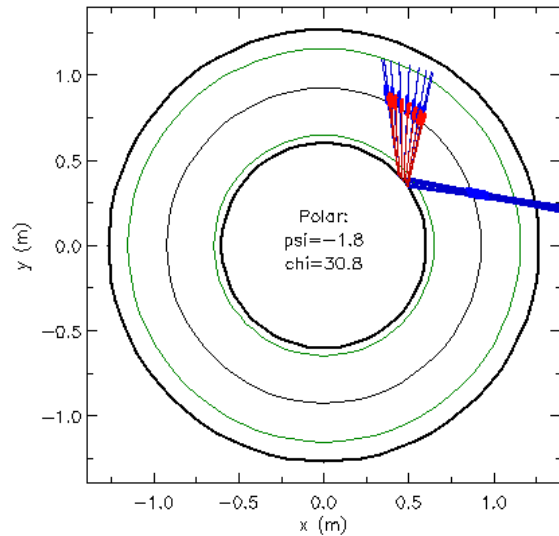
3-4 shot at 5.3T 20°

Verificare effetto positivo/negativo di EC con nullo esterno

OM1 vs XM2

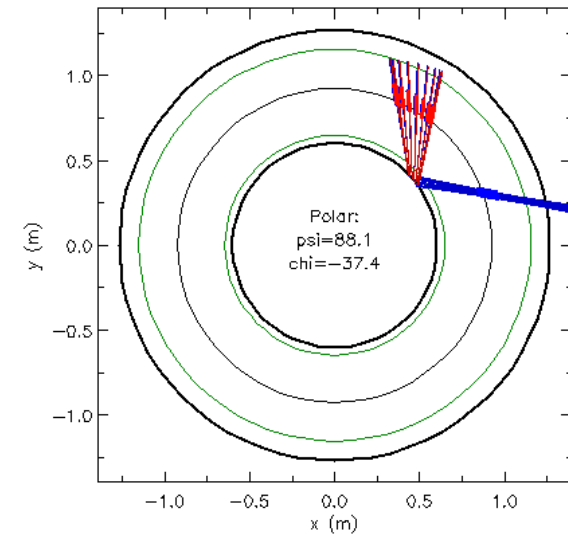
5 shot at 5.3 / 2.5 T – 20°

5.3 T, 20°

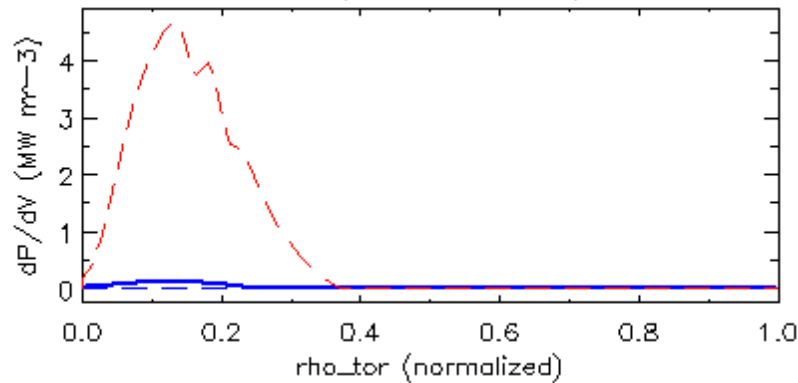


Confronto su FTU
basato su effetto (caso
limite in Vloop e Press)
e segnale di
assorbimento (sniffer)

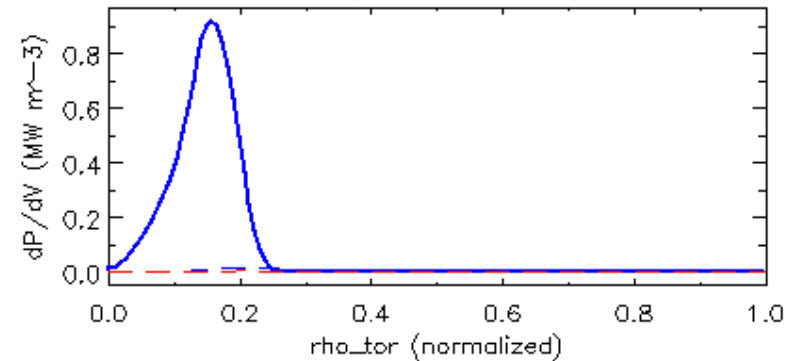
2.5 T, 20°T



$P_{abs}=0.006303$ MW, $\langle\rho_{P}\rangle=0.153$, $d\rho_{P}=0.149$

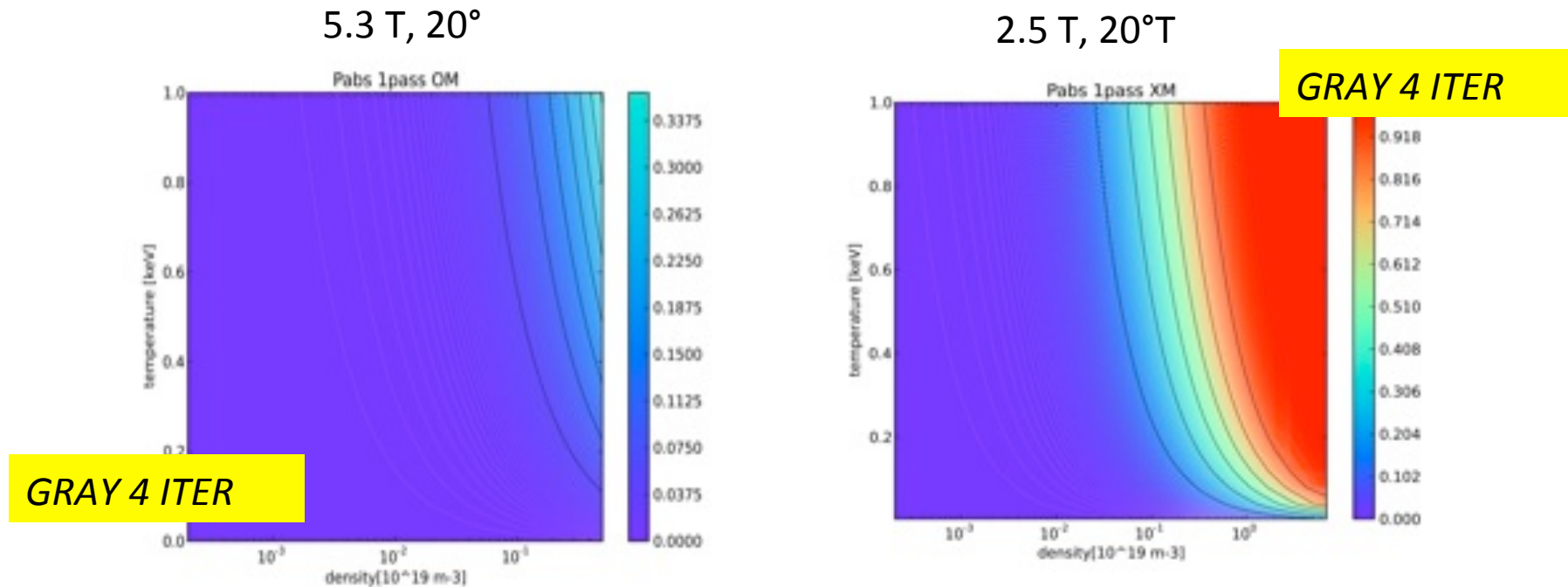


$P_{abs}=0.033475$ MW, $\langle\rho_{P}\rangle=0.159$, $d\rho_{P}=0.105$



In ITER le prime operazioni saranno a 2.5T, lo startup è quindi fondamentale

OM1 vs XM2



In ITER le prime operazioni saranno a 2.5T, lo startup è quindi fondamentale

Confronto su FTU basato su effetto (caso limite in Vloop e Press) e segnale di assorbimento (sniffer)

5 shot at 5.3 /2.5 T – 20°

Draft Pulse List

Data Base: 5
Mode Conversion: 4
Stray Field: 4
O1 vs XM2: 5

Two magnetic fields: 5.3T and 2.5T (2 zero)

Total program good shots: **18+2**

ECRH: 350 + 400 @ 0.0s for 100ms from P12 only

Diagnostics:

Sniffer, H-alfa, TSC+Mich., Telecamere, SIRIO, SOFT-X,
Brems