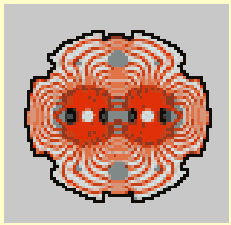
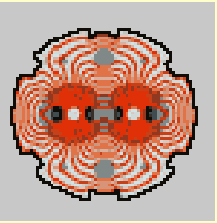


Results obtained using the Strip Detectors in the SPS

G. Arduini, P. Collier, G. Ferioli, B. Henrist, N. Hilleret, L. Jensen, J.M. Jimenez, K. Weiss, F. Zimmermann

AT / AB Collaboration



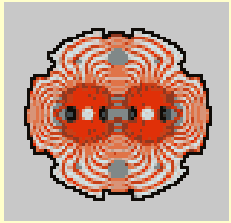
Main topics

- **Set-ups description:**
  - Cold Strip Detector (CSD)
  - Variable Aperture Strip Detector (VASD)
- **Scrubbing effect at RT and at 30 K**
- **Heat loads at RT and at 30 K in Dipole and Field free regions**
- **Spatial distribution at RT and at 30 K**
  - Effect of the scrubbing
  - Effect of the dipole field
  - Effect of the vacuum chamber height
- **Conclusions**

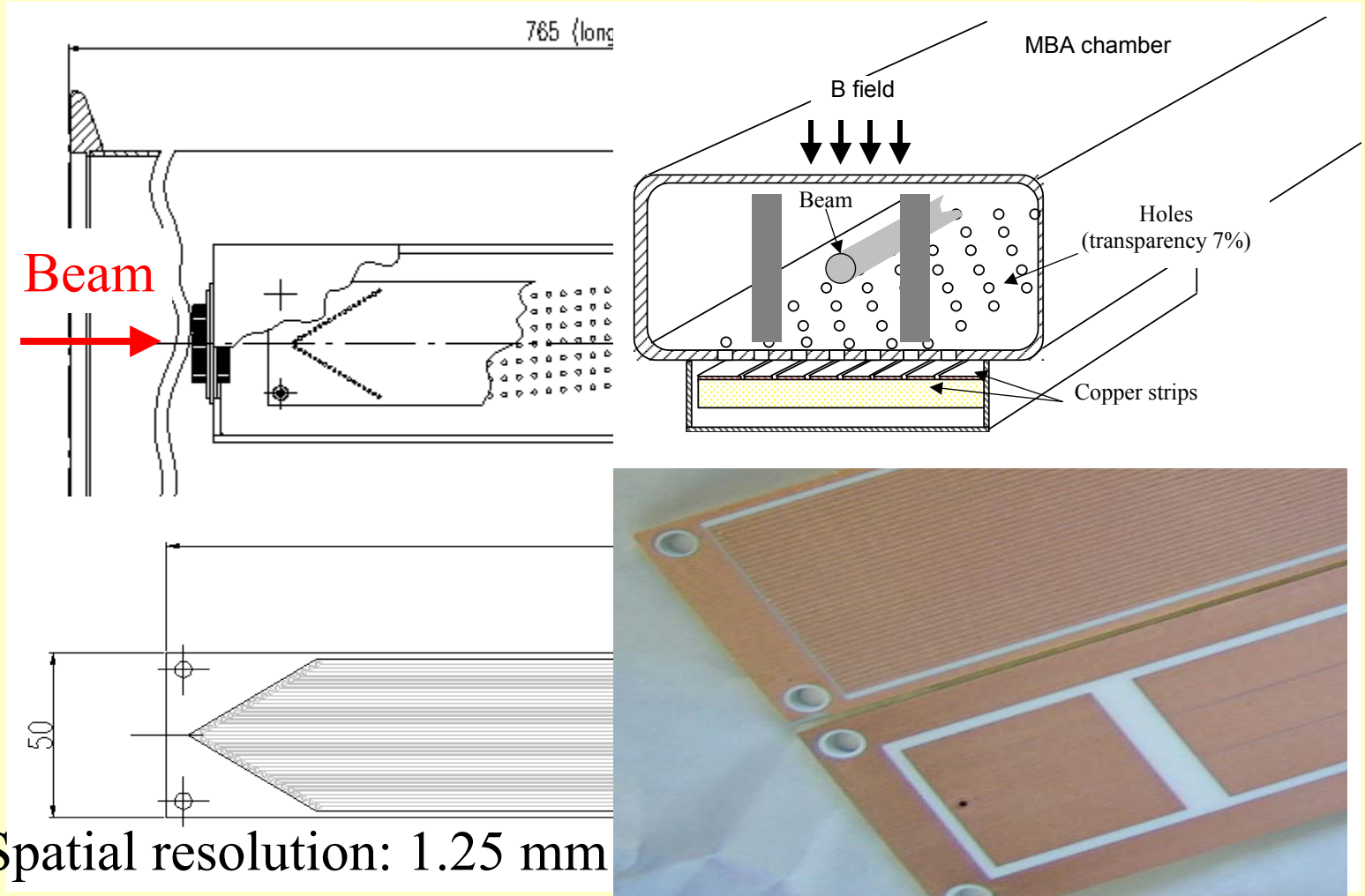
G. Arduini, P. Collier, G. Ferioli, B. Henrist, N. Hilleret, L. Jensen, J.M. Jimenez, K. Weiss, F. Zimmermann

Set up description

…48 channels Strip detectors…



Available in a dipole field region



Spatial resolution: 1.25 mm

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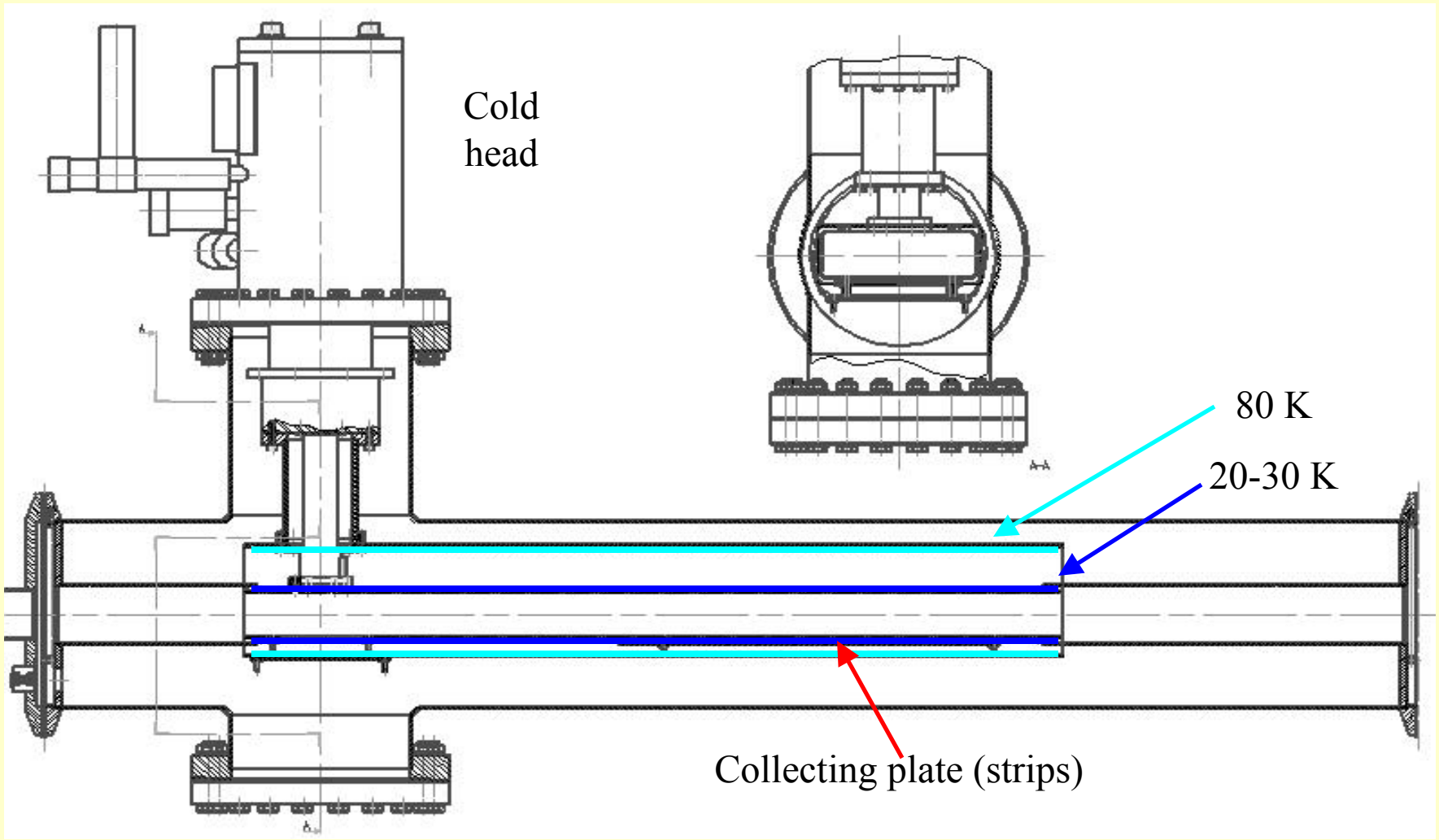
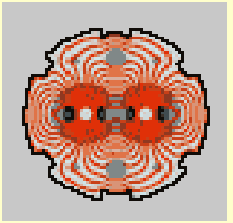
…Cold Strip Detector…

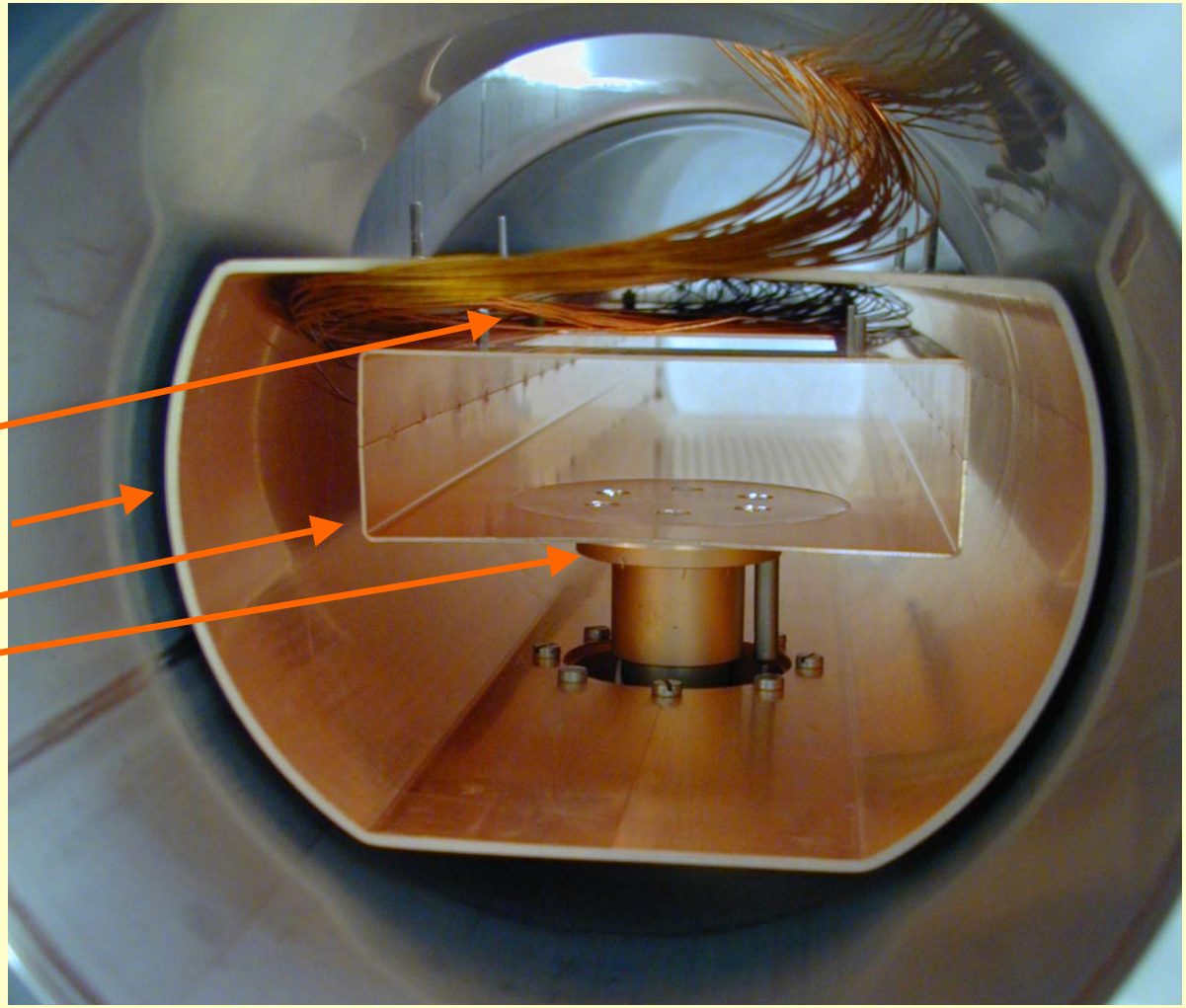


G. Arduini, P. Collier, G. Ferioli, B. Henrist, N. Hilleret, L. Jensen, J.M. Jimenez, K. Weiss, F. Zimmermann

…Cold Strip Detector…



- Collecting strips
- Thermal shielding (80 K)
- Beam “pipe” (< 30 K)
- Cold head



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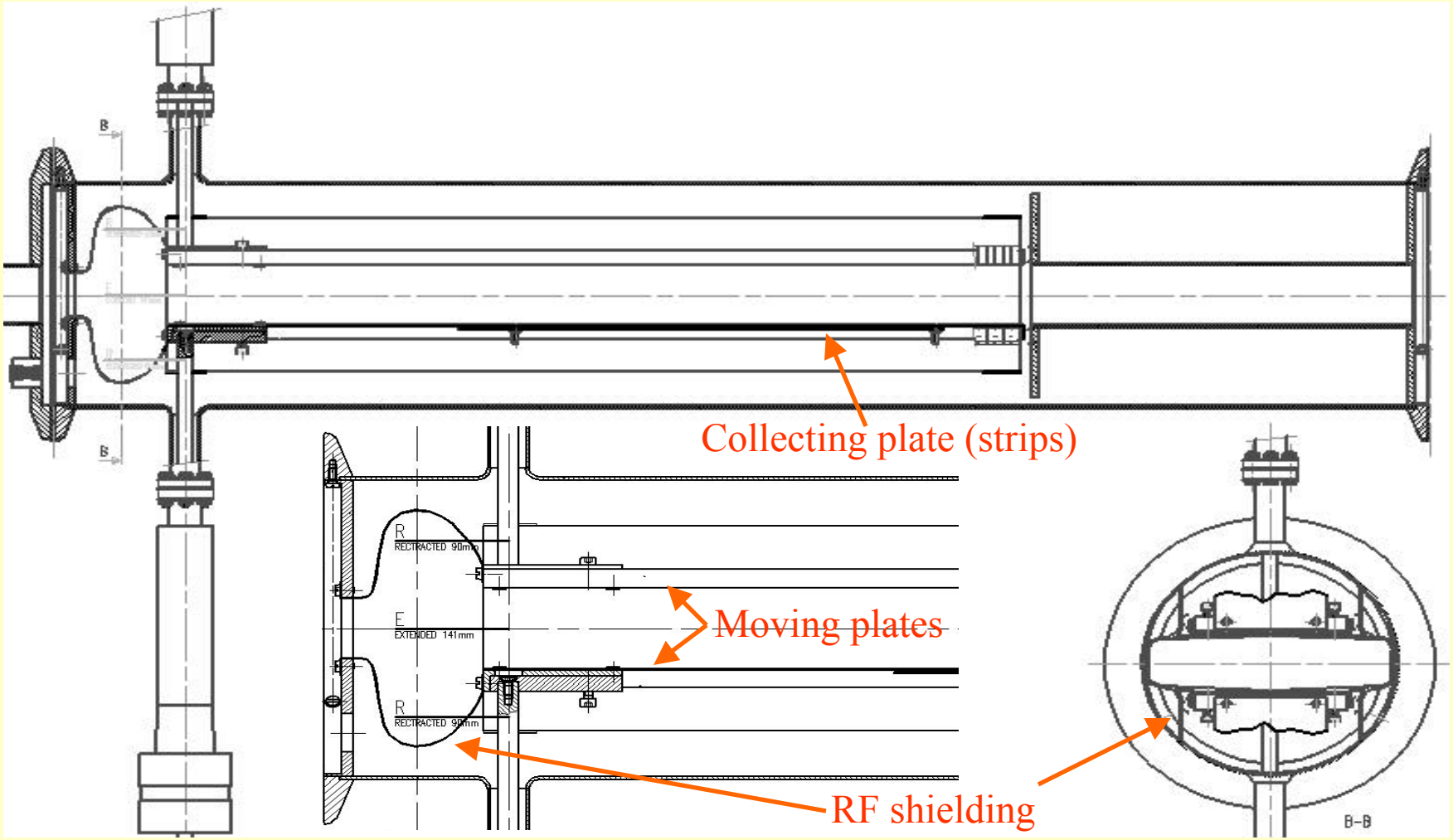
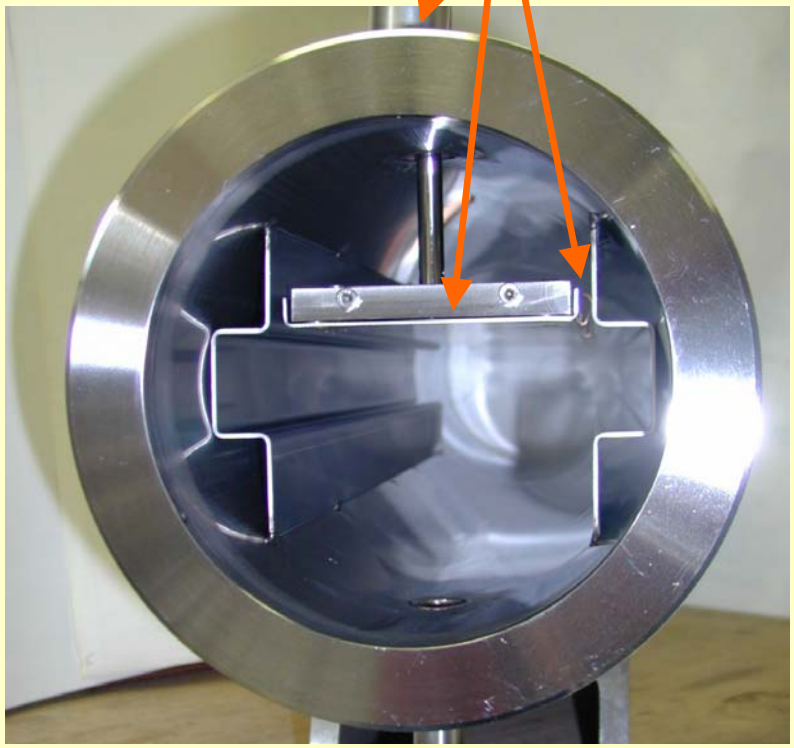
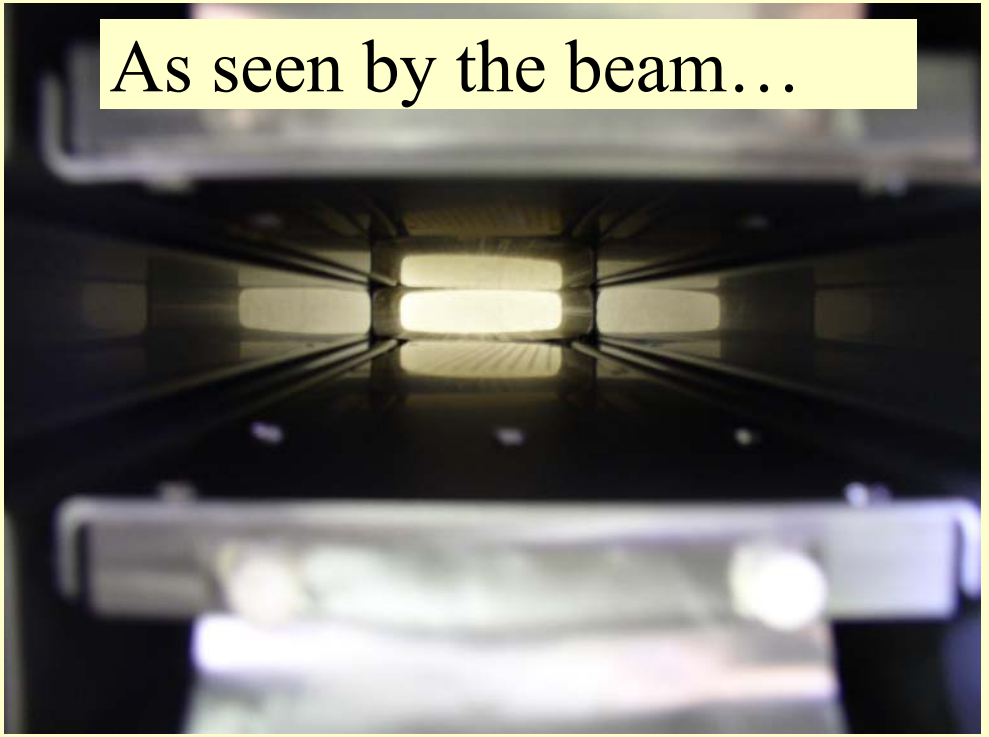
…Variable Aperture Strip Detector…



G. Arduini, P. Collier, G. Ferioli, B. Henrist, N. Hilleret, L. Jensen, J.M. Jimenez, K. Weiss, F. Zimmermann

…Variable Aperture Strip Detector…





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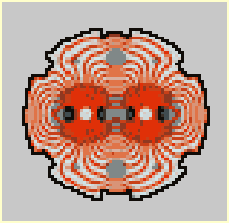
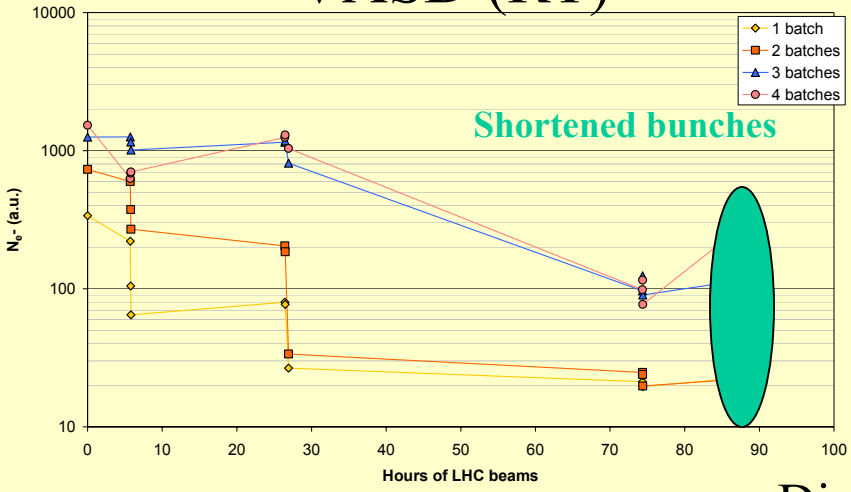
Electron Cloud Activity

30K, RT, Dipole & Field Free

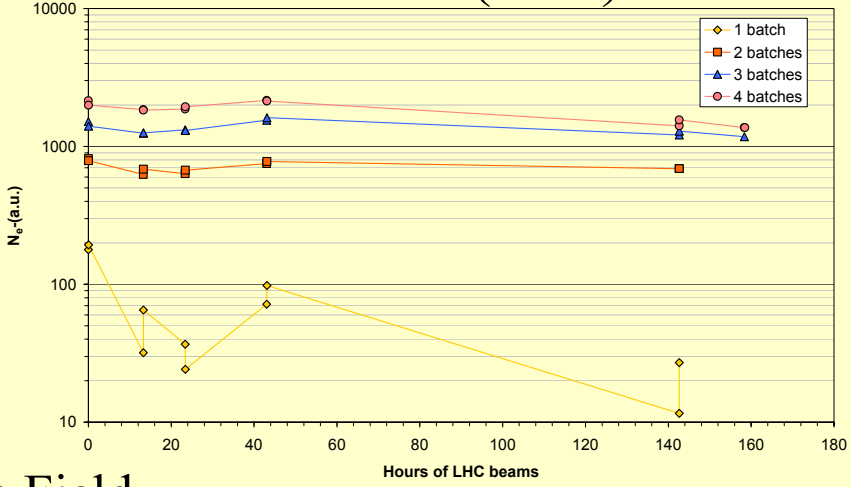


VASD (RT)

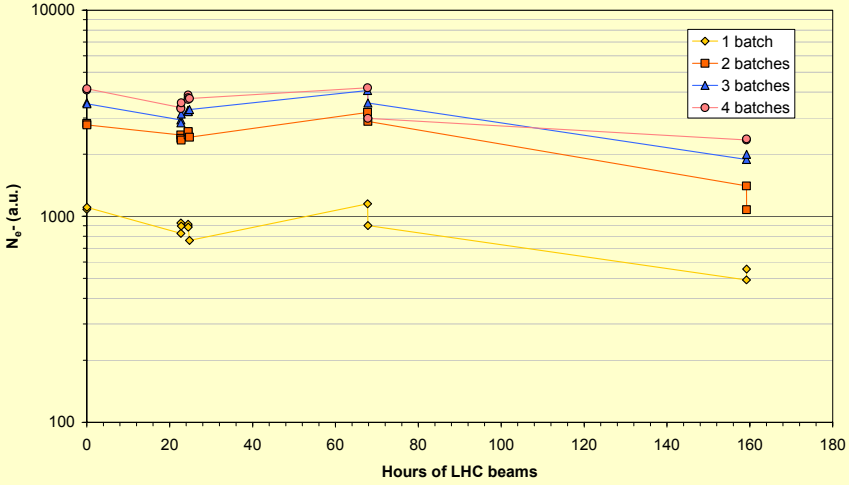


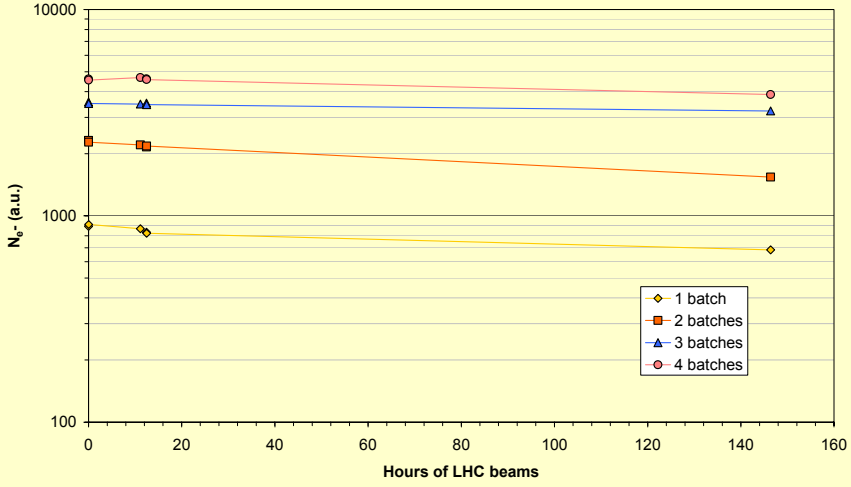
Field free

CSD (30K)



Dipole Field





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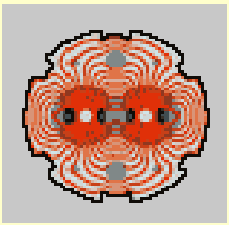
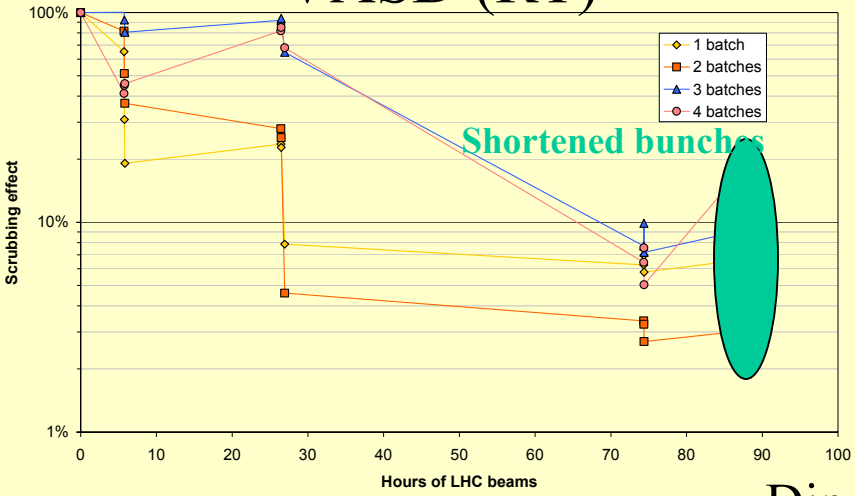
Electron Cloud: Scrubbing Evidence

30K, RT, Dipole & Field Free

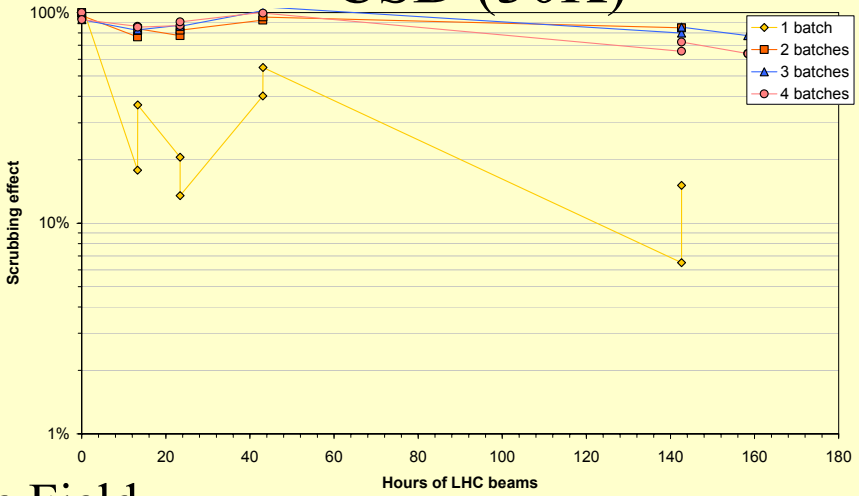


VASD (RT)

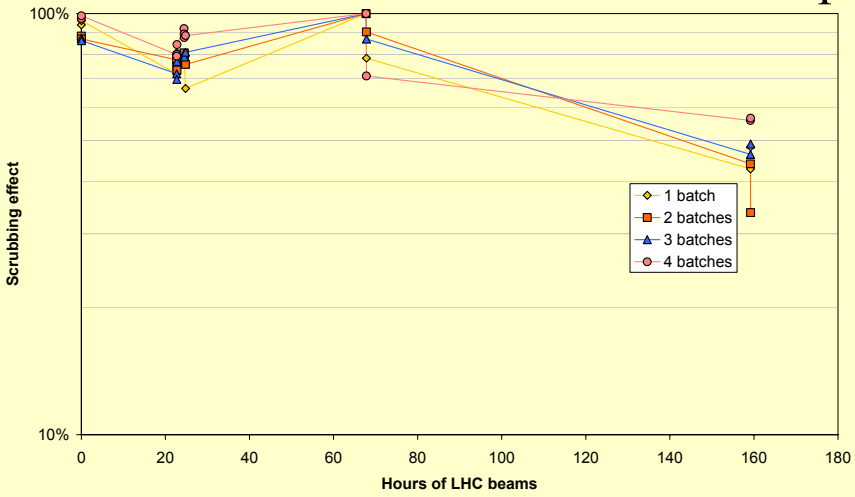


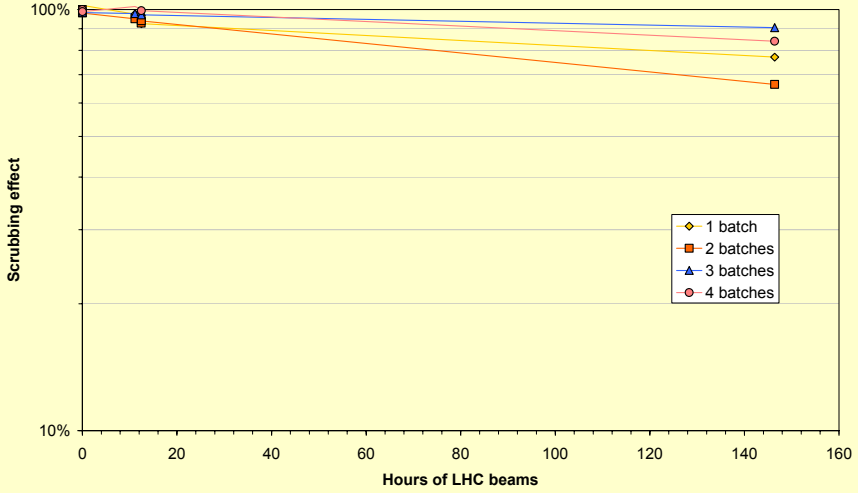
Field free

CSD (30K)



Dipole Field





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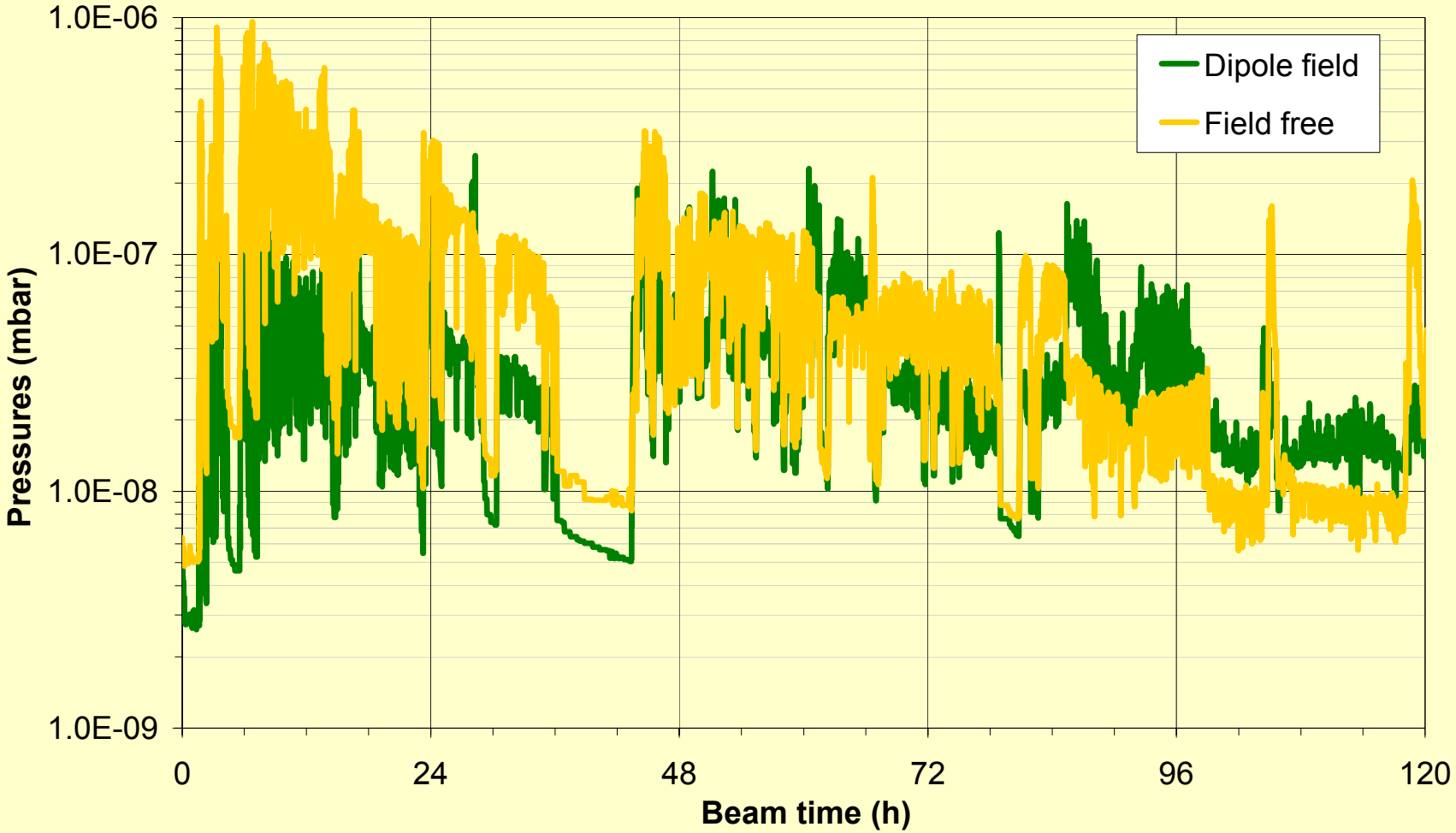
Scrubbing effect

Evidence of Scrubbing effect

Pressures rise



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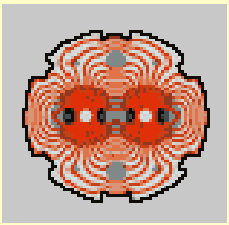
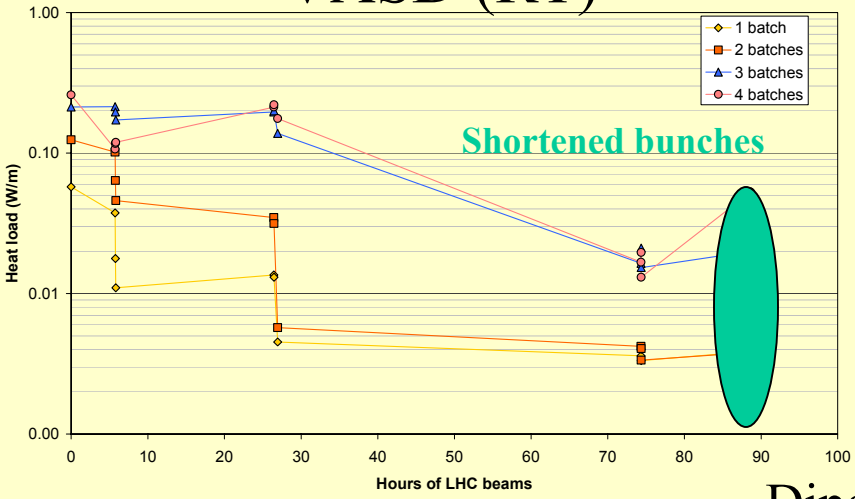
Electron Cloud: Heat Load ($\bar{E}$=190$_{FF}$/300$_{DF}$ eV)

30K, RT, Dipole & Field Free

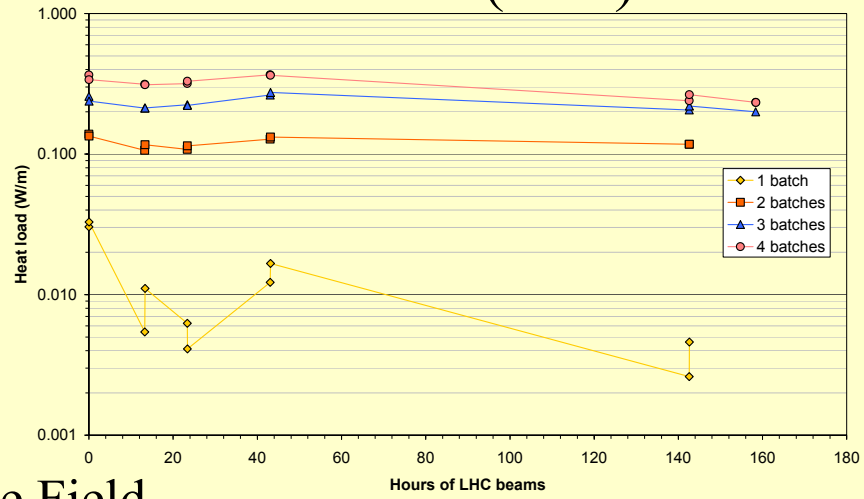


VASD (RT)

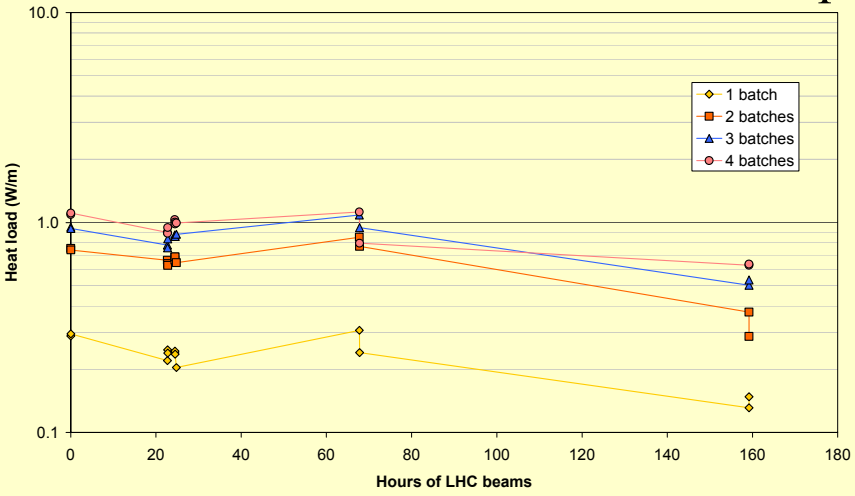


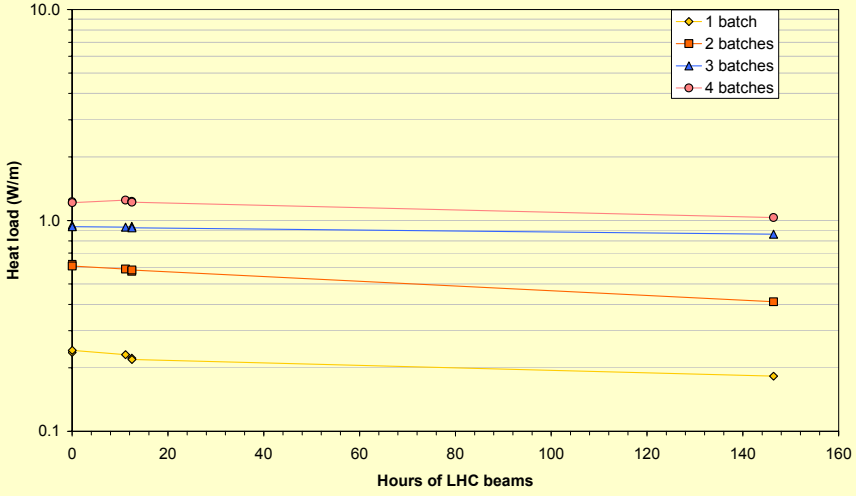
Field free

CSD (30K)



Dipole Field





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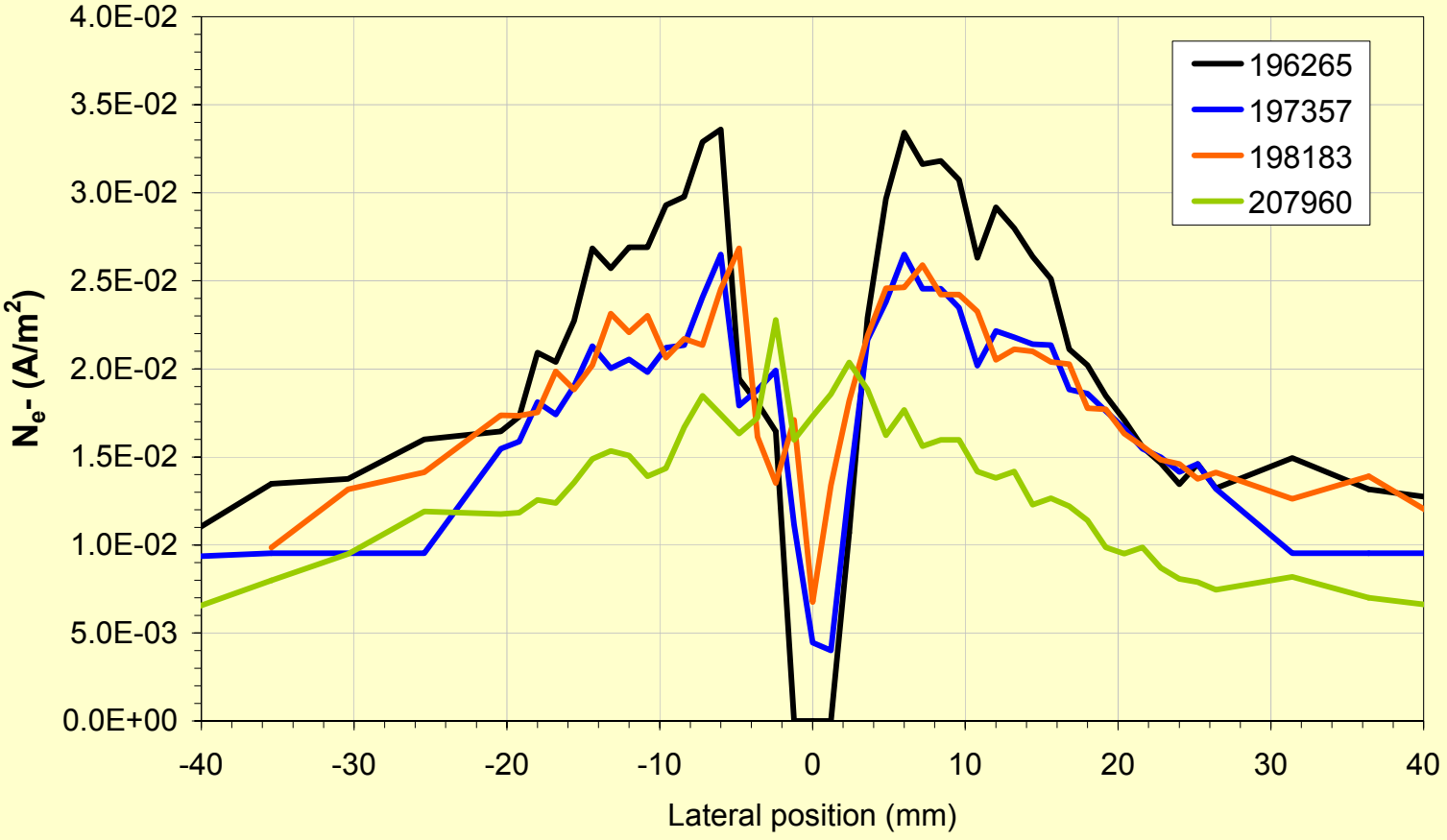
Spatial Distribution at 30 K (Cold Strip Detector)

Field Free Conditions

Evolution during the scrubbing run



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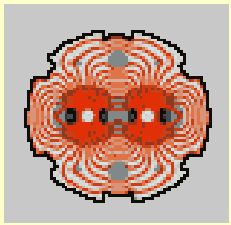

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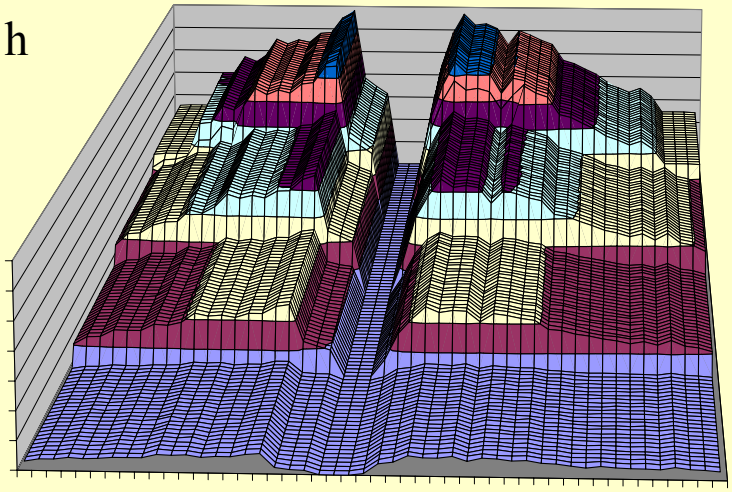

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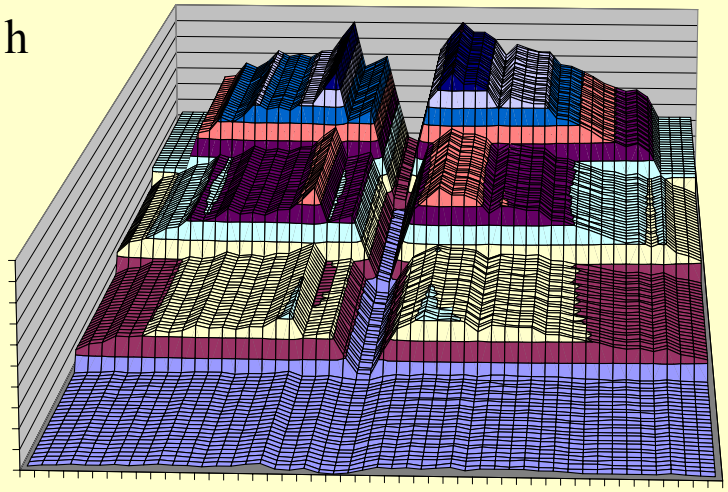
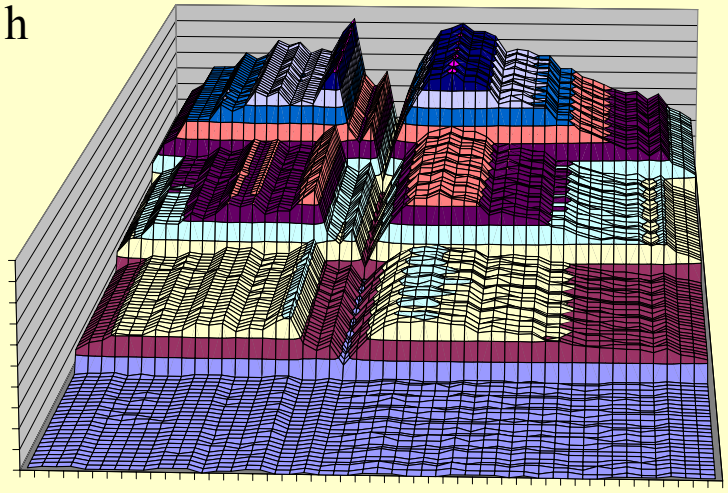


23 h



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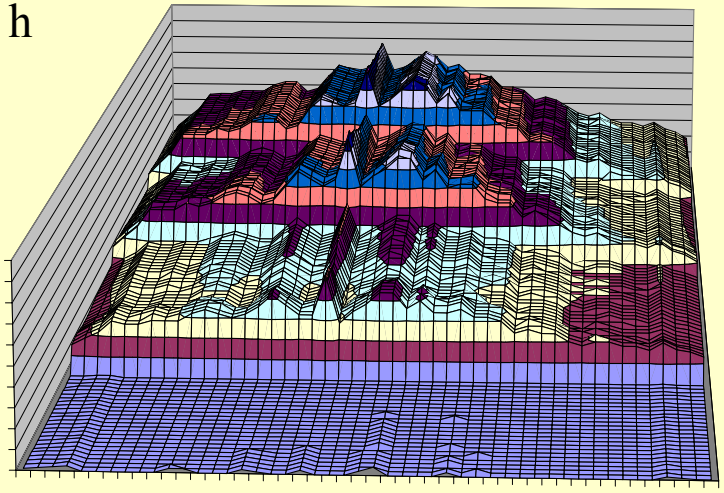

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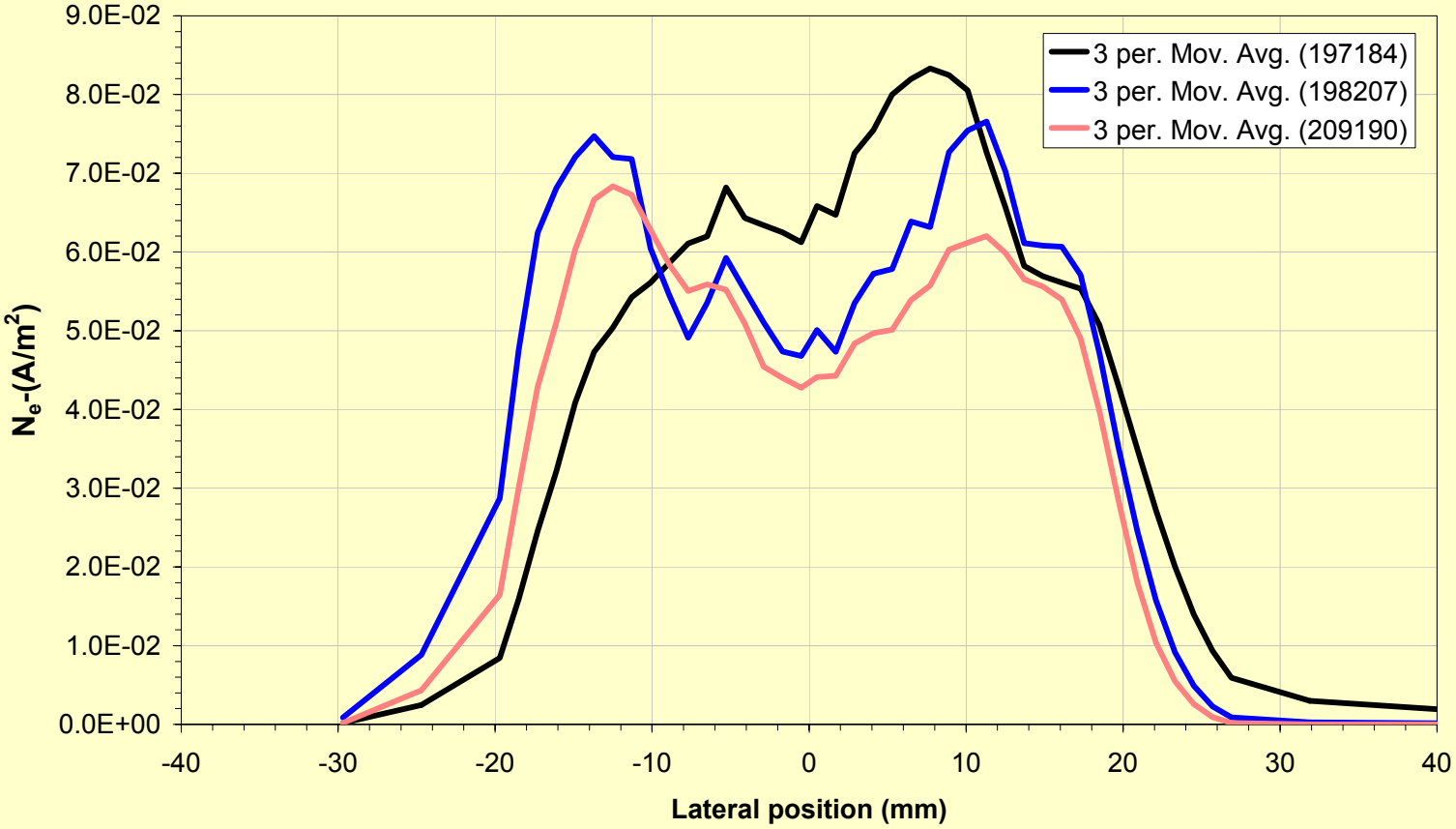
Spatial Distribution at 30 K (Cold Strip Detector)

Dipole Field Conditions

Evolution during the scrubbing run



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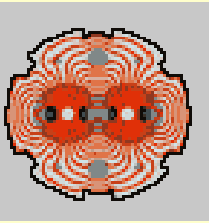

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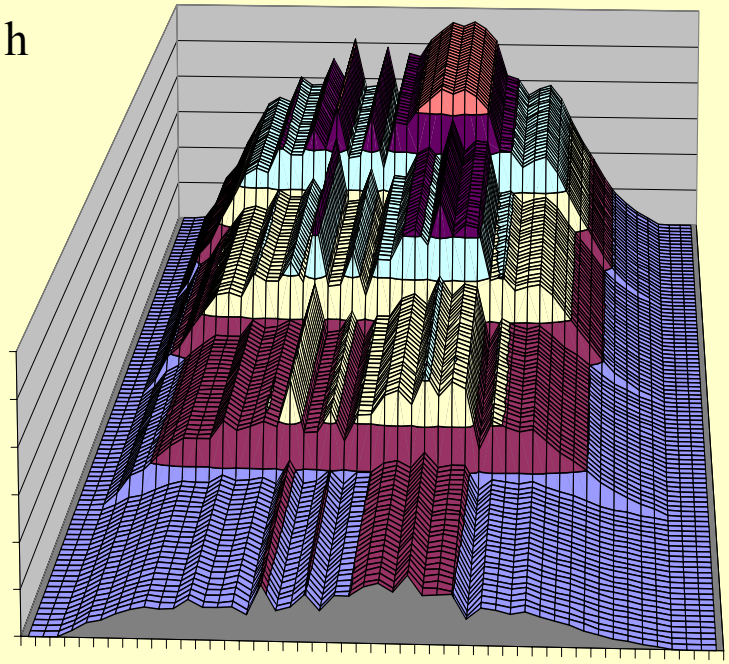

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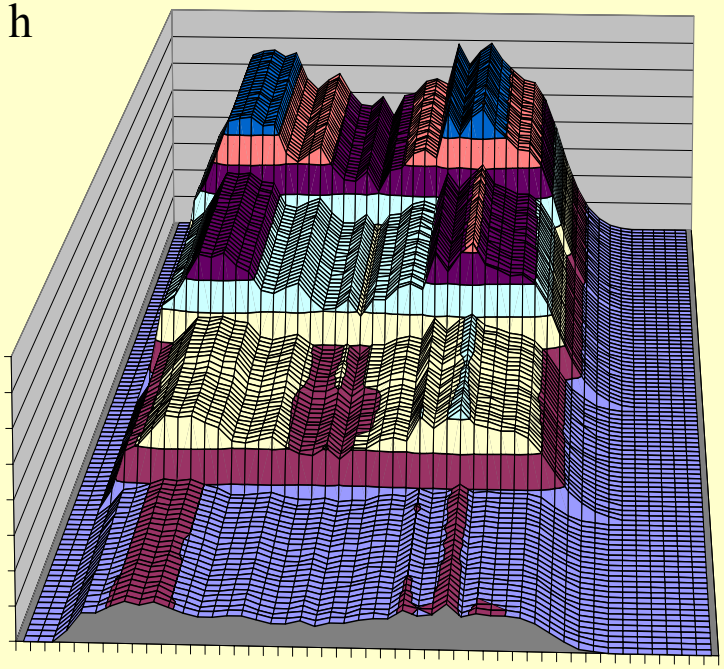

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Spatial Distribution at RT (VASD Strip Detector)

Field Free Conditions

Dependence on Vacuum chamber height

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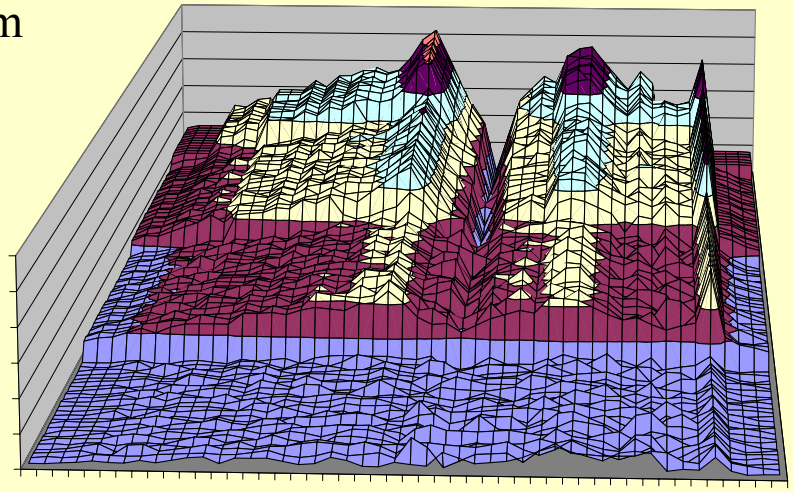
Spatial Distribution at RT (VASD Strip Detector)

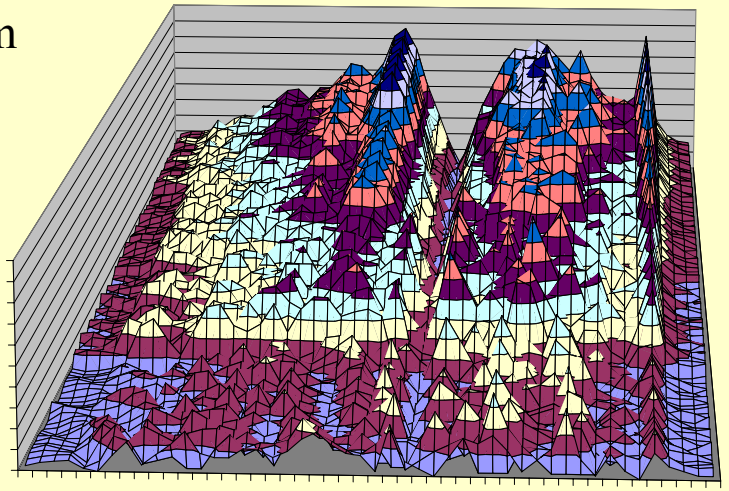
Field Free Conditions

Dependence on Vacuum chamber height

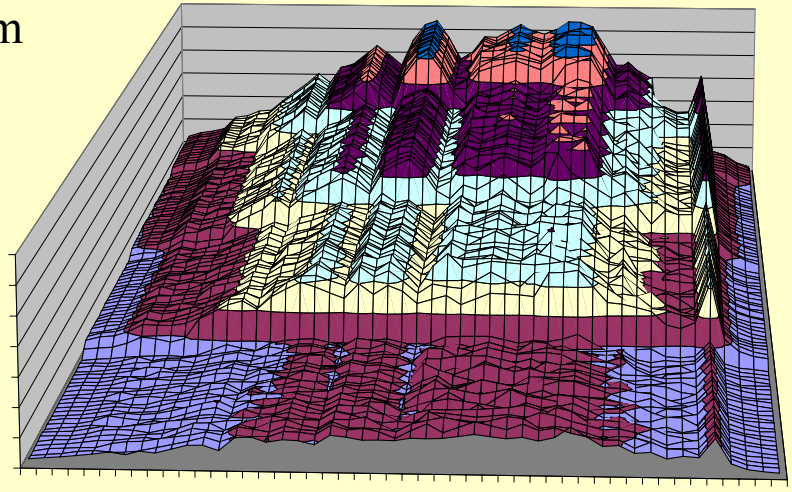
35mm



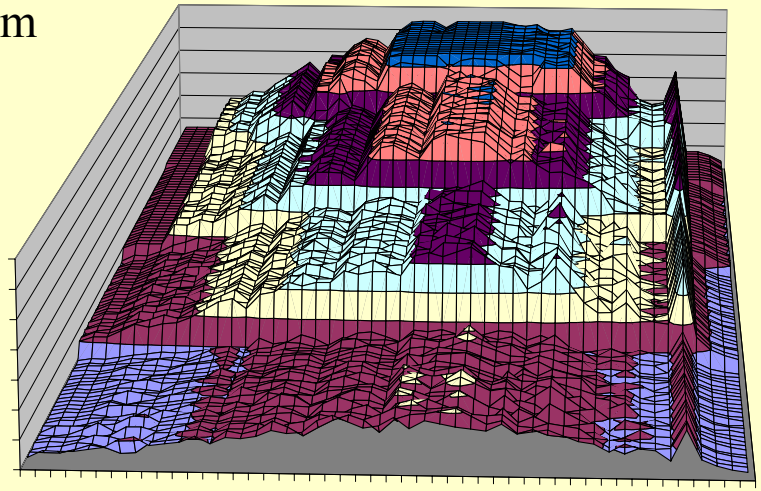
50mm



65mm



80mm



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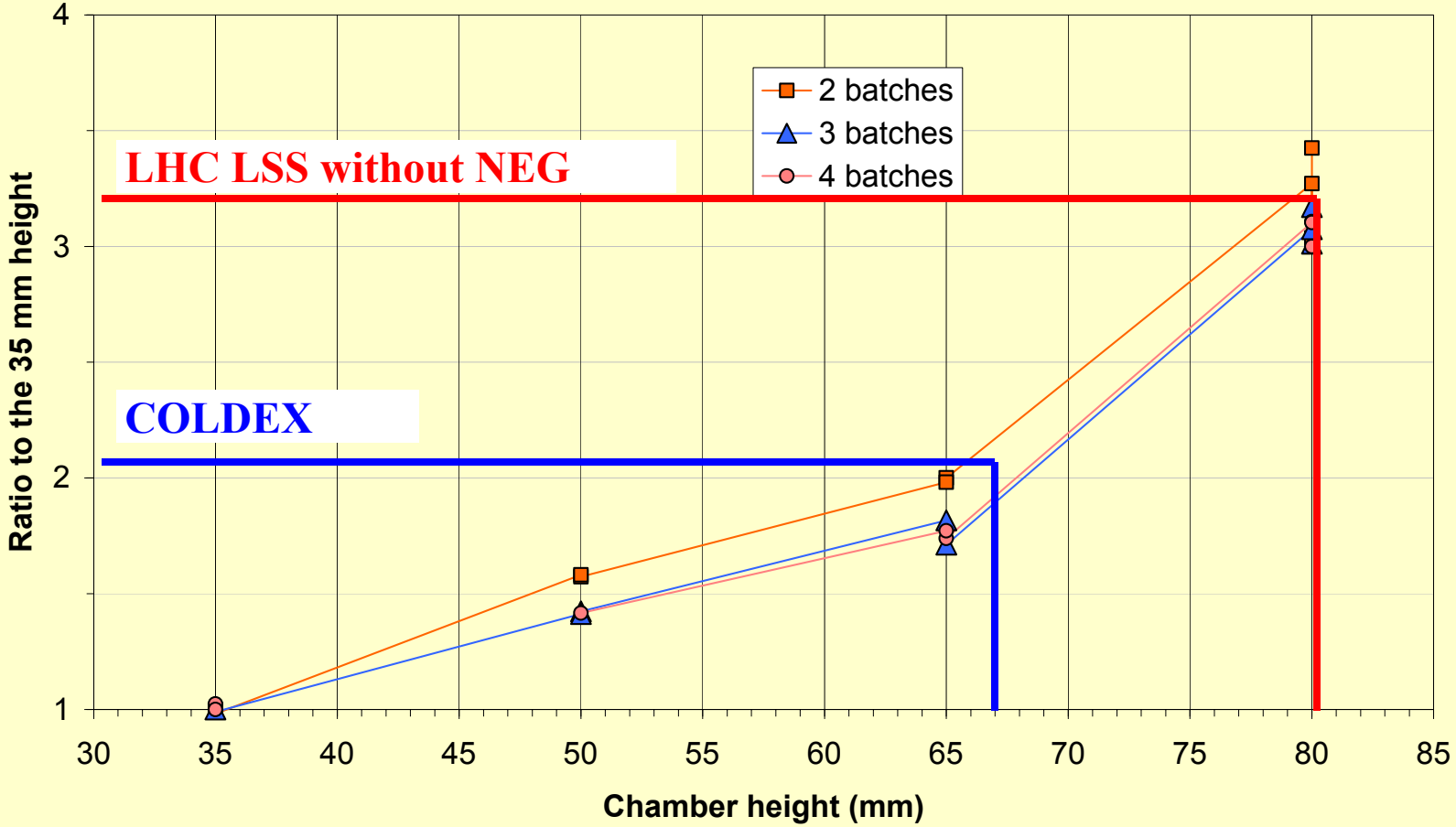
Spatial Distribution at RT (VASD Strip Detector)

Field Free Conditions

Dependence on Vacuum chamber height



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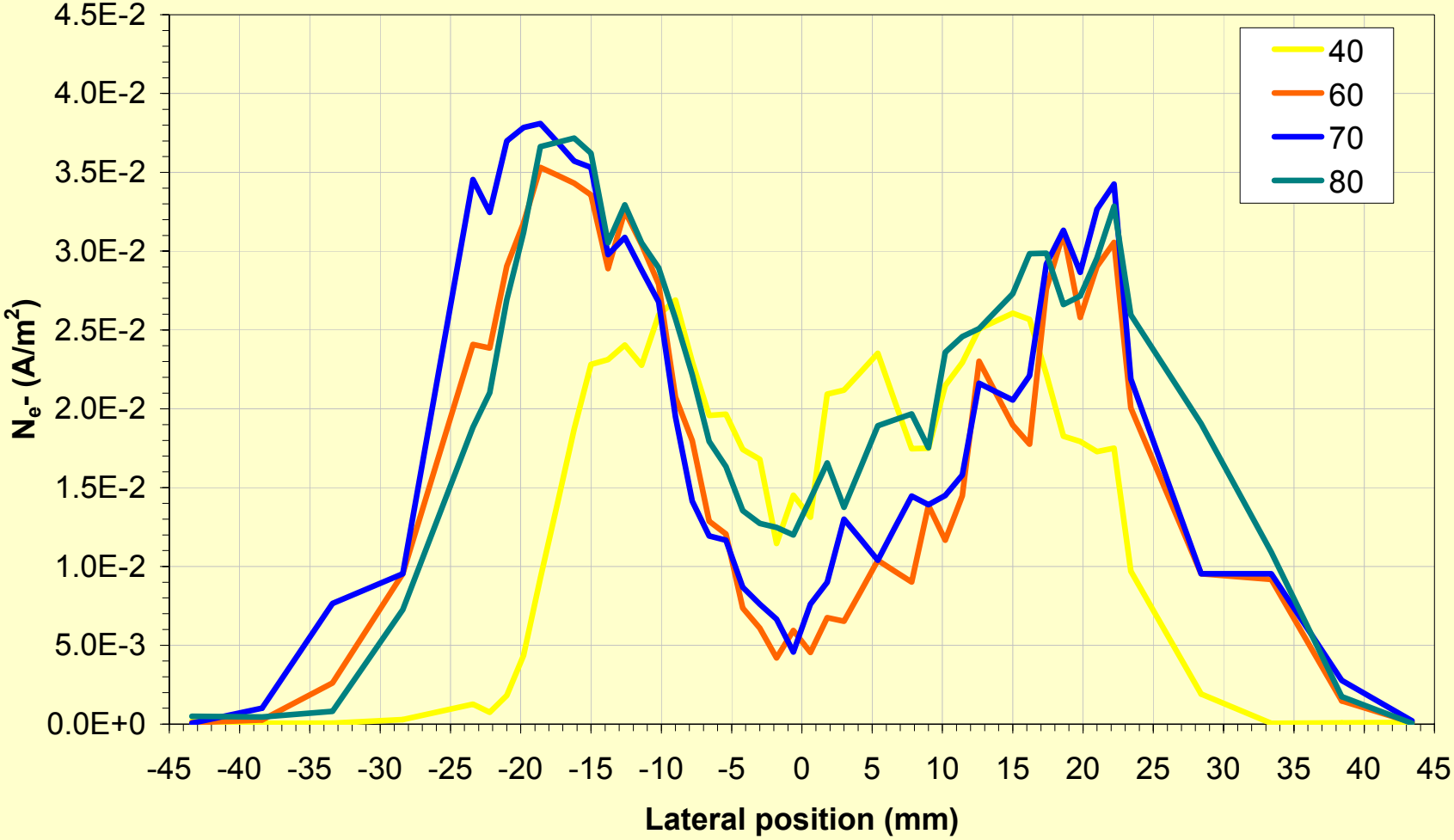
Spatial Distribution at RT (VASD Strip Detector)

Dipole Field Conditions

Dependence on Vacuum chamber height



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AT Division, Vacuum Group
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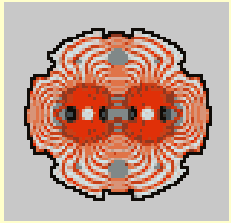
Spatial Distribution at RT (VASD Strip Detector)

Dipole Field Conditions

Dependence on Vacuum chamber height



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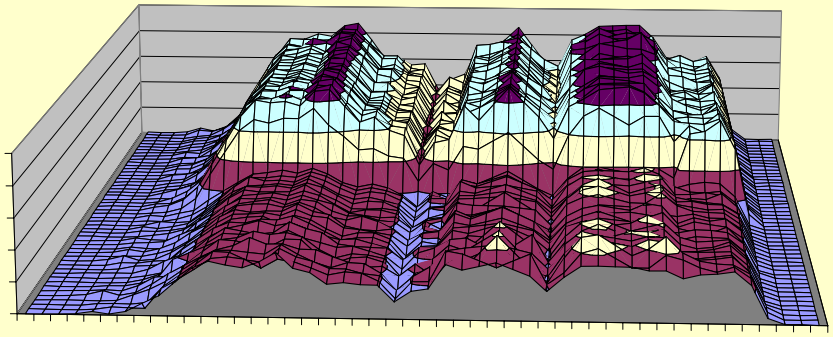

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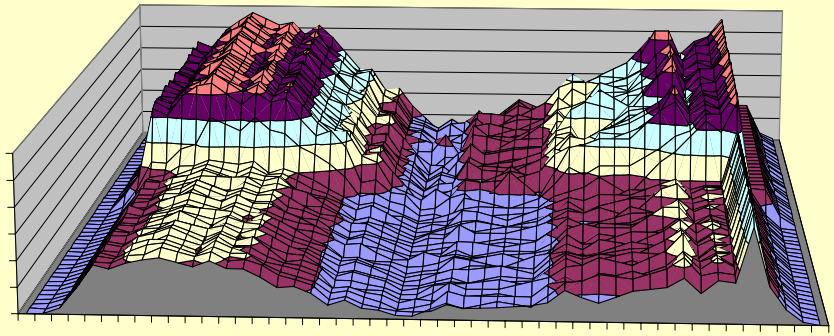
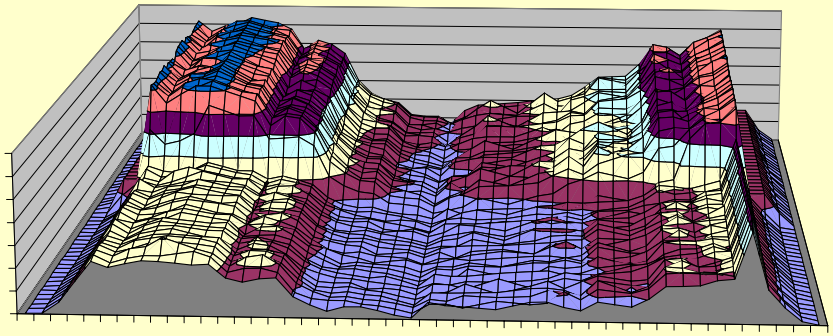


70mm



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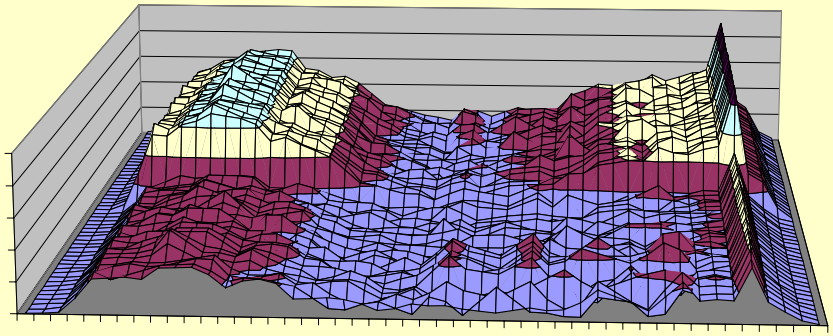

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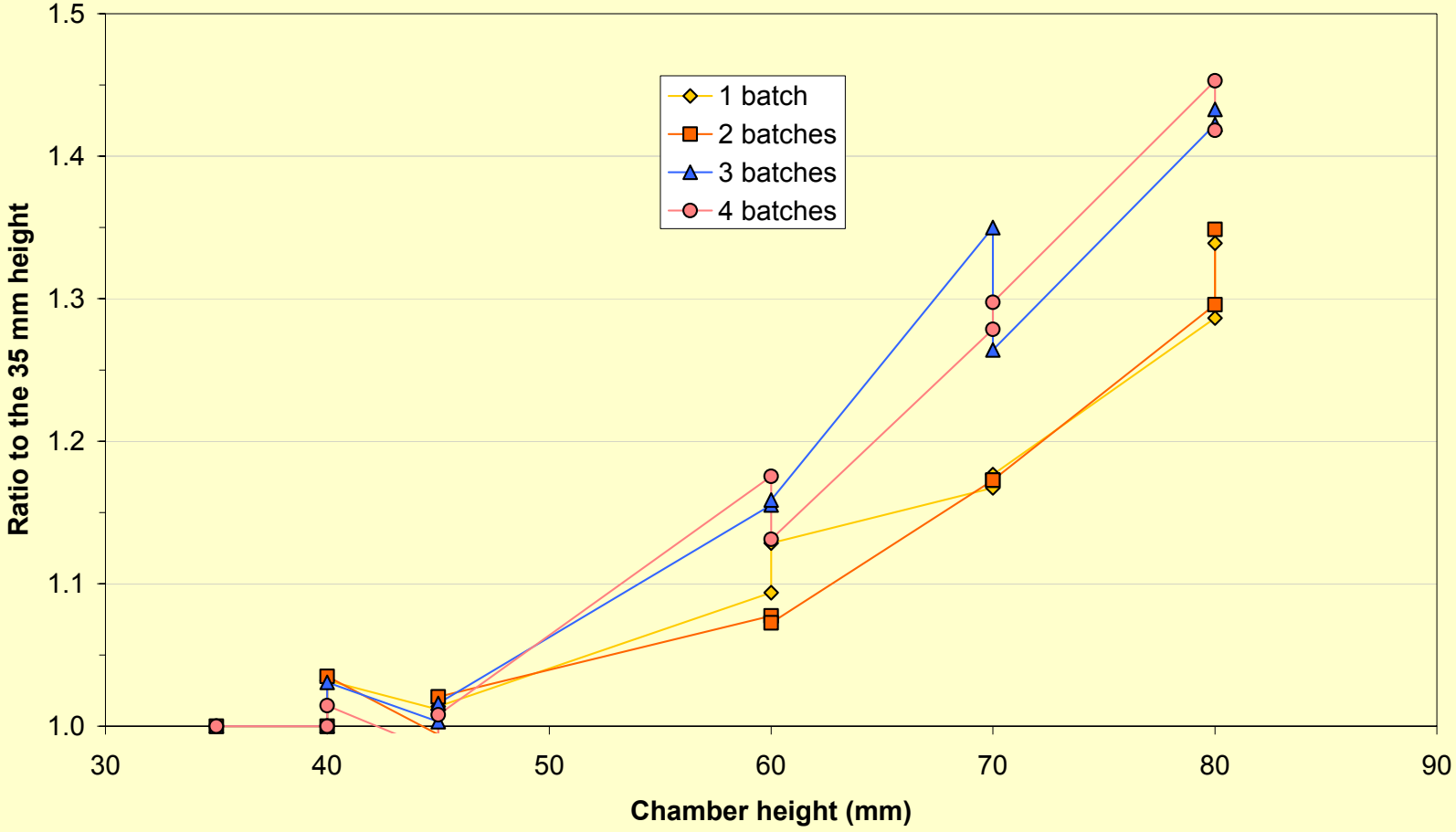
Spatial Distribution at RT (VASD Strip Detector)

Dipole Field Conditions

Dependence on Vacuum chamber height



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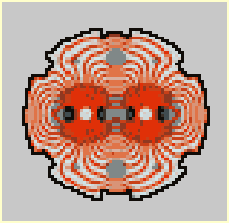
Preliminary conclusions (1)



- **The electron cloud activity is identical at 30K and at RT in both dipole and field free conditions**
- **The scrubbing effect was confirmed by the room temperature measurements, by the SEY detector (1.4 reached) and by the pressure decrease.**
- **The decrease is less pronounced in the dipole field conditions, consistent with last year measurements.**
- **At 30K, the scrubbing is much less pronounced, however a decrease tendency is visible. The extrapolation of the tendency shows that the scrubbing at cold is about:**
  - 3 times slower in the field free conditions
  - 5 times slower in the dipole field conditions

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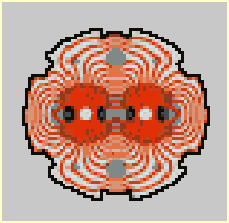
Preliminary conclusions (2)



- **The heat load at the start up in the SPS and extrapolated to the LHC assuming a linear dependence with the filling factor is, for both cold and RT parts (vacuum chamber height: 35 mm):**
  - Field free : 0.35 W/m 1.05 W/m
  - Dipole field: 1.10 W/m 3.05 W/m
- **The dependence on the vacuum chamber height has been measured:**
  - Field free conditions:

    Exponential dependence with the height, factor 3.2 more at 80 mm as compared to 35 mm
  - Dipole field conditions:

    Exponential dependence with the height, factor 1.4 more at 80 mm as compared to 35 mm
- **Spatial electron distribution also vary with the height of the chamber**

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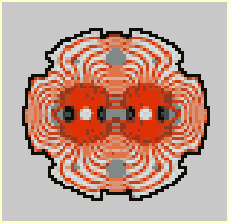
Preliminary conclusions (3)



	In the SPS			Extrapolated to the LHC	
	Before Scrubbing (W/m)	After 133 h of scrubbing run (W/m)	Ratio (%)	Before Scrubbing (W/m)	After 133 h of scrubbing run (W/m)
	4 batches - 1.1×10^{11} p/bunch			Filling factor = 1	
VASD / DF (45 mm)	1.11	0.63	-43%	3.05	1.90
VASD / FF (45 mm)	0.51	0.02	-96%	1.39	0.06
CSD / DF (45 mm)	1.15	1.03	-10%	3.16	3.10
CSD / FF (45 mm)	0.47	0.23	-50%	1.29	0.70

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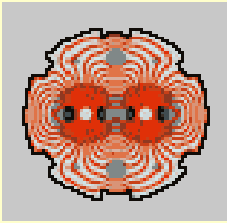
Acknowledgments



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