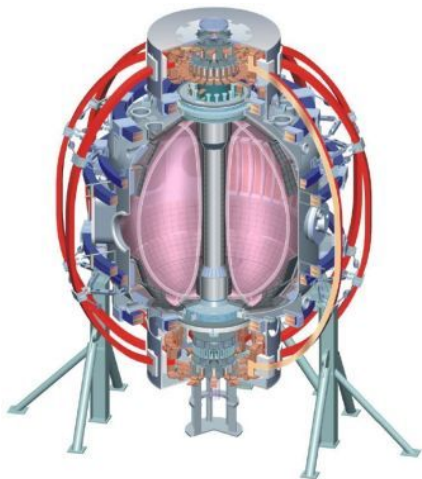


LLD Fast Visible Camera Diagnostics Preliminary Results

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Reflectivity Change During Warm up

- Four areas were analyzed: cold segment, warm segment (KH, LITER F + LITER K), warm segment (BH, LITER F + LITER K), warm segment (BH, only LITER K, under CS shadow)
- Vessel filament illumination, cold plate used as reference for filament intensity
- Averaged over >100 pixels, norm. to filament intensity
- IR emission from plates too low to account for the increase in reflectivity (~confirmed using IR filter)

Area-1: Segment HE (not heated)

Area-2: Segment KH (sees both LITER-F and LITER-K)

Area-3: Segment BH (sees both LITER-F and LITER-K)

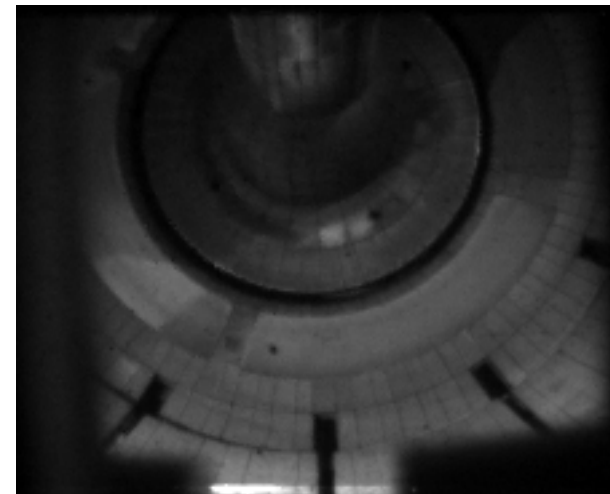
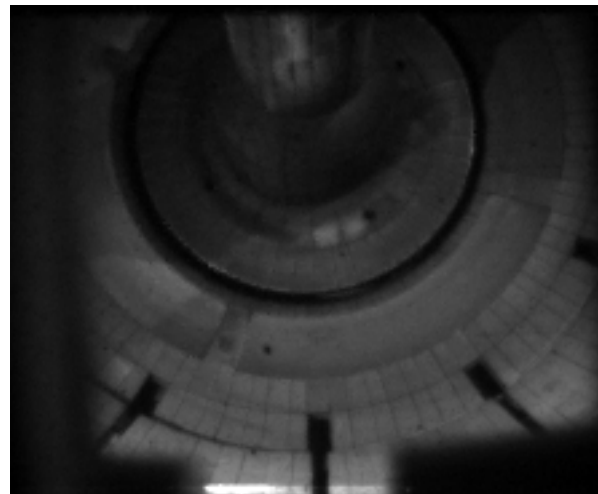
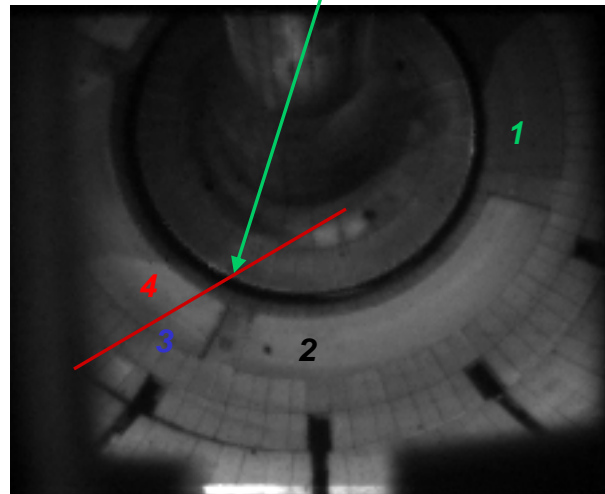
Area-4: Segment BH (sees only LITER-K)

Bay F LITER
Shadow

T= 50C

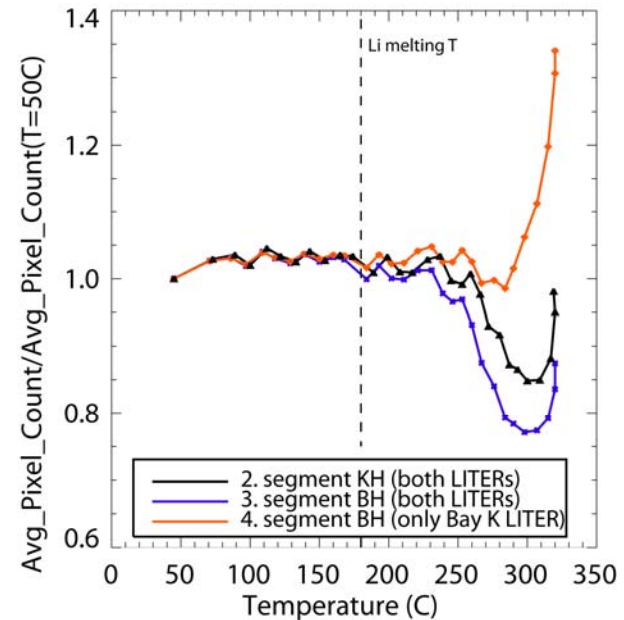
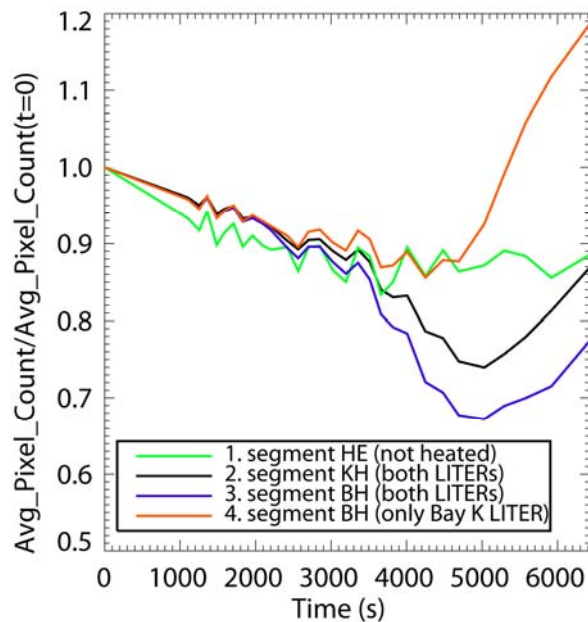
T= 290C

T= 320C



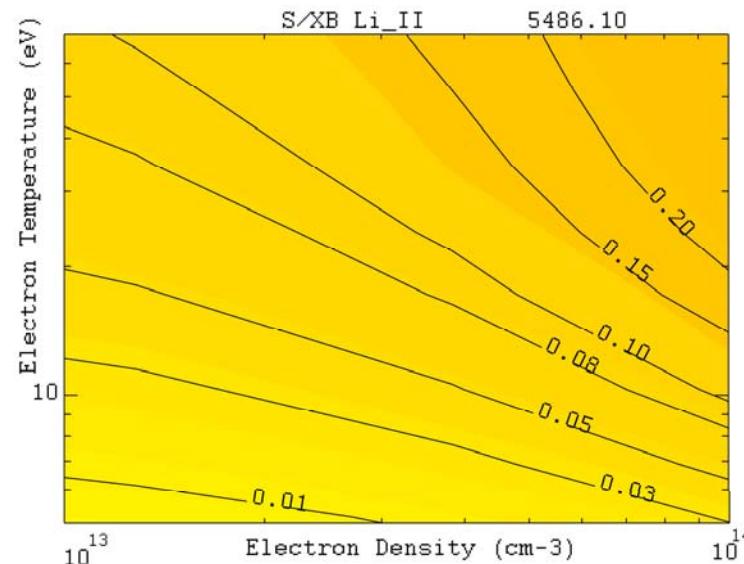
Reflectivity drops for T higher than 250C, rises back for T>300C

- All areas behave similarly until Li melting T is reached.
- After 250C the reflectivity drops until about 300C when it starts ramping up.
- Decrease in reflectivity more pronounced on areas with heavier lithium coating.
- Lithium melting decreasing reflectivity?
- Eliminating undesired Li compounds above 300C?



Lithium Impurity Influxes and D-alpha Emission Analysis

- Bay E camera: Li II filter, absolutely calibrated.
- Bay J camera: D-alpha filter, non calibrated.
- Radial slices from the 2D images were taken to get emission profiles.
- ADAS S/XB coefficients were used to convert measured brightness (photons /(m^2 sr s)) to lithium ion influxes (ionizations /(m^2 s)).
- For this analysis assumed $T_e=20\text{eV}$ $n_e=3e13\text{cm}^{-3}$. Need data from super tile probe, S/XB coefficients change with plasma parameters.



Effect of LLD temperature on divertor Li ion influxes

Cold segment

Warm segment

$R=0.63\text{ m}$

• **Li II emission (548.61nm)**

• **Time averaged (0.5-0.7 s)**

• **No ELMs**

• **137555-T=273C**

• **137556-T=295C**

• **137562-T=315C**

• **137563-T=315C**

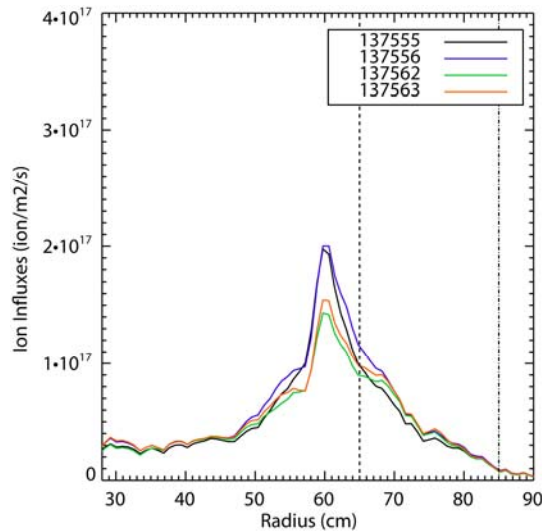
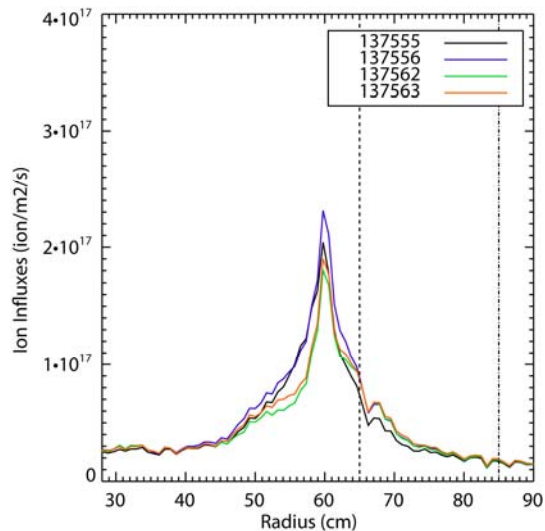
• **Practically no change**

• **Similar effect with OSP on bullnose and LLD**

• **Slight decrease with higher LLD T to be further analyzed**

• **Need super tile probes data**

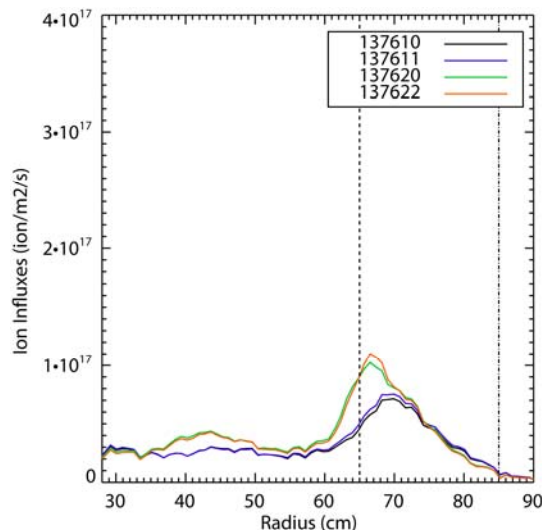
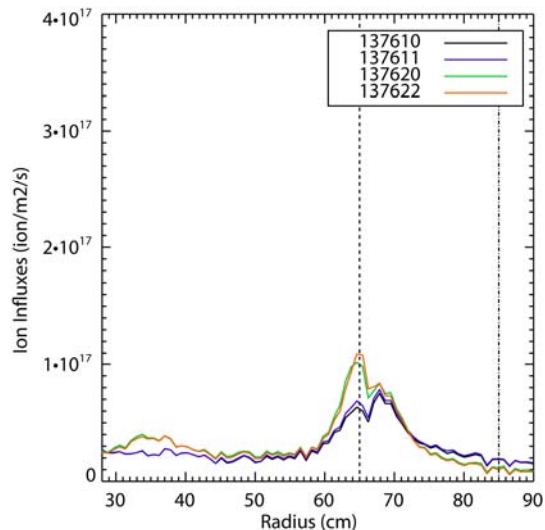
• **No big difference between cold and warm segment**



Cold segment

Warm segment

$R=0.67\text{ m}$



• **137610-T=320C**

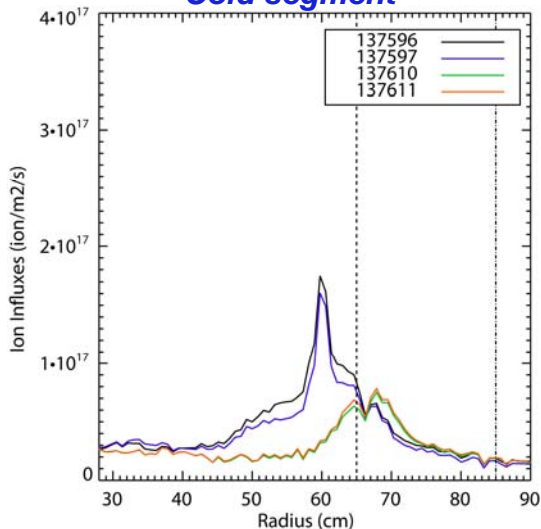
• **137611-T=320C**

• **137620-T=250C**

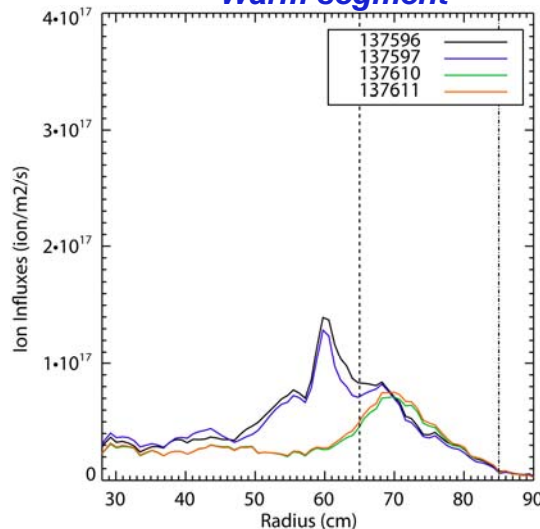
• **137622-T=200C**

Effect of OSP position on divertor Li ion influxes

Cold segment



Warm segment

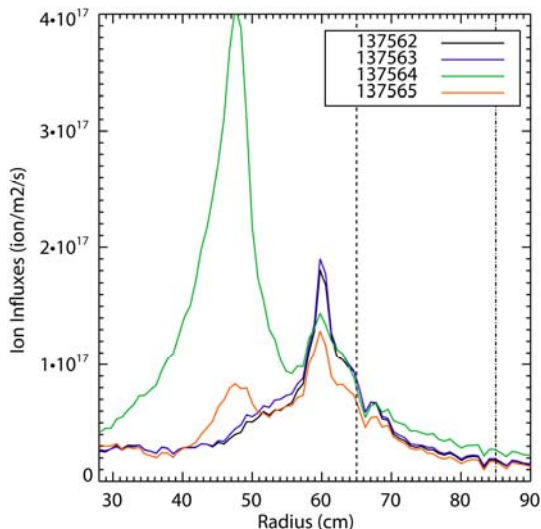


$T=320C$

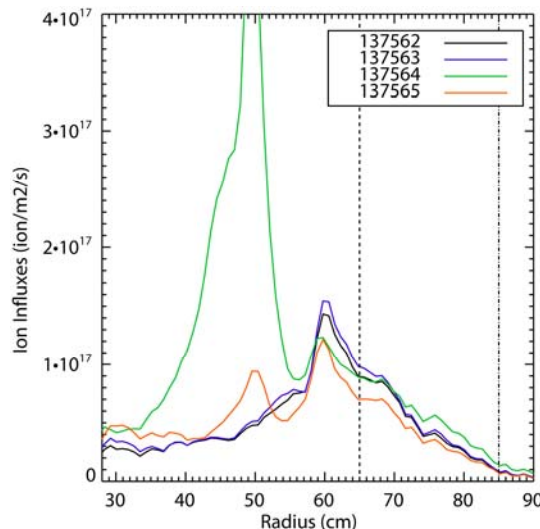
- 137596-R=0.62
- 137597-R=0.63
- 137610-R=0.67
- 137611-R=0.67

- Li II emission (548.61nm)
- Time averaged (0.5-0.7 s)
- No ELMs

Cold segment



Warm segment



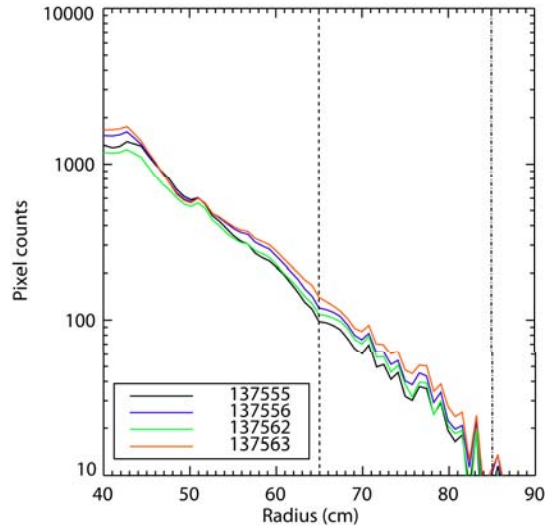
$T=315C$

- 137562-R=0.63
- 137563-R=0.63
- 137564-R=0.5
- 137565-R=0.5

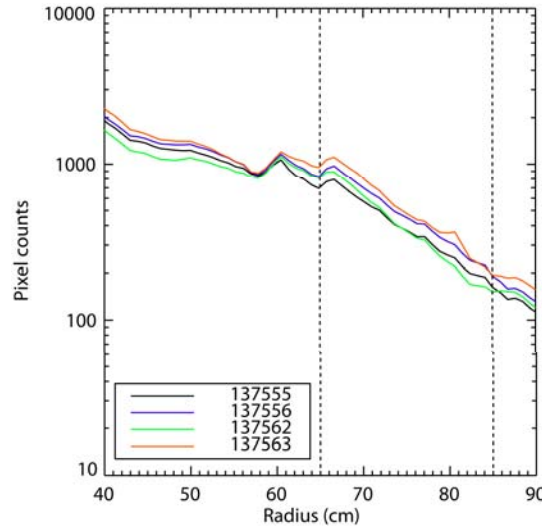
- Practically no change
- Moving out the OSP Li ion flux less peaked
- Need super tile probes data
- No big difference between cold and warm segment

Effect of LLD temperature on divertor D-alpha emission

Cold segment



Warm segment



$R=0.63\text{ m}$

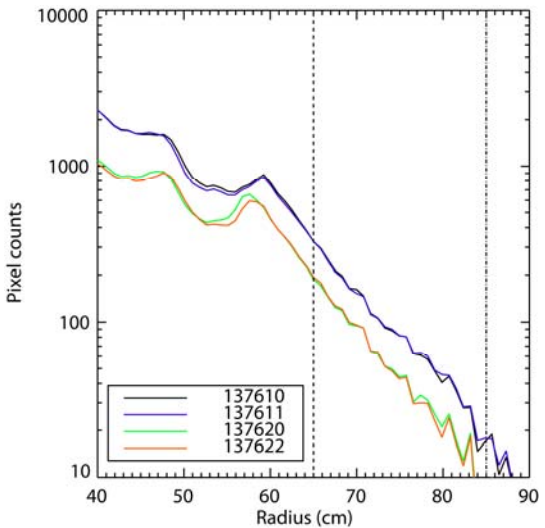
- 137555-T=273C
- 137556-T=295C
- 137562-T=315C
- 137563-T=315C

- D alpha emission
- Time averaged (0.5-0.6 s)
- No ELMs

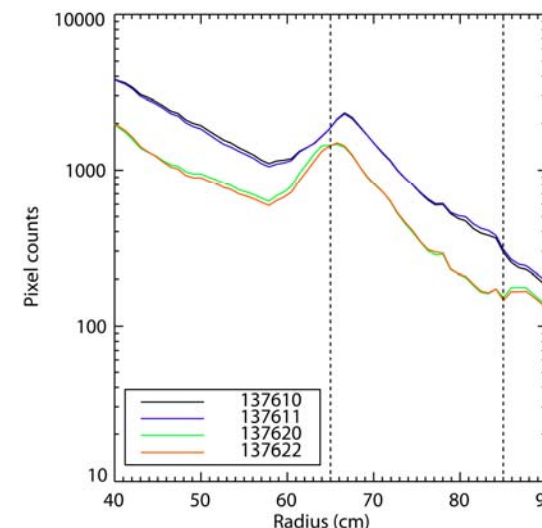
• Higher D-alpha emission with warm LLD

• No big difference between cold and warm segment, same trend

Cold segment



Warm segment



$R=0.67\text{ m}$

- 137610-T=320C
- 137611-T=320C
- 137620-T=250C
- 137622-T=200C

Effect of OSP position on divertor D-alpha emission

- *D alpha emission*
- *Time averaged (0.5-0.6 s)*
- *No ELMs*

Cold segment

Warm segment

$T=320C$

- $137550-R=0.63$
- $137610-R=0.67$
- $137611-R=0.67$

• **Higher D-alpha emission with OSP on LLD**

• **No big difference between cold and warm segment**

