



# *Determination of radiated power density profile using bolometer data for DT Baseline Scenario at JET*

**Gediminas Stankunas, LEI**

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**JET**

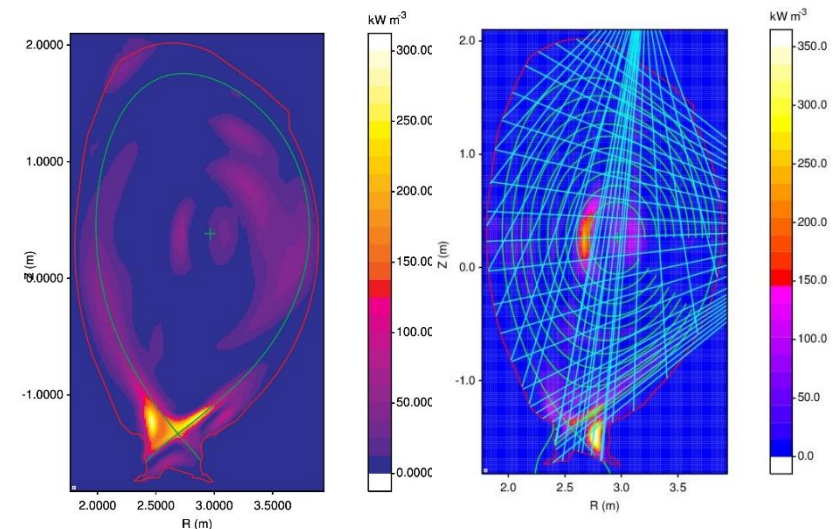


This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.

# LEI contribution to FUSION



- **Lithuanian Energy Institute** (city of Kaunas) signed association agreement and became involved in EFDA since 2007.
- Since 2012 LEI become involved in activities related to DONES, DEMO and JET neutronics.
- In addition, in EUROfusion project LEI is involved in the several activities:
  - **JET1 – JET campaigns (since 2014)**
    - **Participation in JET Campaigns C35-C38... (Bolometer data analysis and reconstruction)**



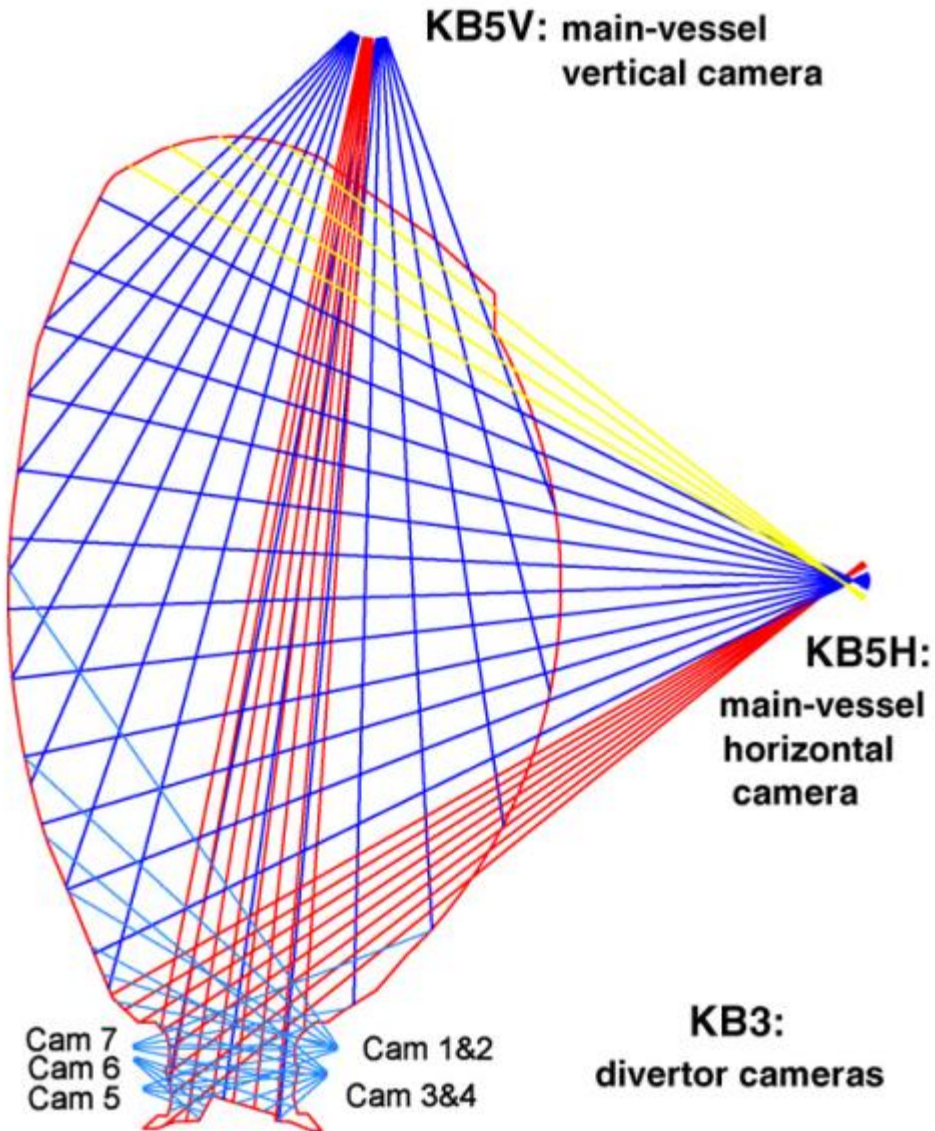
# Background of LEI contribution to bolometry



- In general, the question of the **validity of the bolometry data is still open**, at least for **the baseline scenario data**, and having a good measure of the bulk radiation is essential to estimate the loss power through the pedestal/separatrix, which is at the core of the analysis in **JET experimental campaign** and various pedestal/core tasks.
- In most of JET pulses **the total radiation (TOPI)** is lower than the so-called **bulk radiation (TOBU or TOBH)**.
- It is most likely not a fault is data analysis, but some sort of effect due to the **high NBI power affecting some channels** looking at the outer plasma in the vicinity of the NBI injection.

**LEI has performed tomographic reconstructions for some of best M15-01 pulses at JET within H2020 project EUROfusion under the Work Package JET1.** Essentially further investigation encourages if the radiation pattern in the core changes when pellets are considered (and the density & temperature profiles are slightly different & there may be more resiliency to impurity accumulation).

# Bolometer at JET



Two main-vessel bolometric cameras with horizontal (KB5H) and vertical (KB5V) views of the plasma cross-section have been installed, providing a substantial upgrade in capabilities: more viewing chords, higher energy range, higher sensitivity, lower noise and therefore, lower detectable signals at JET.

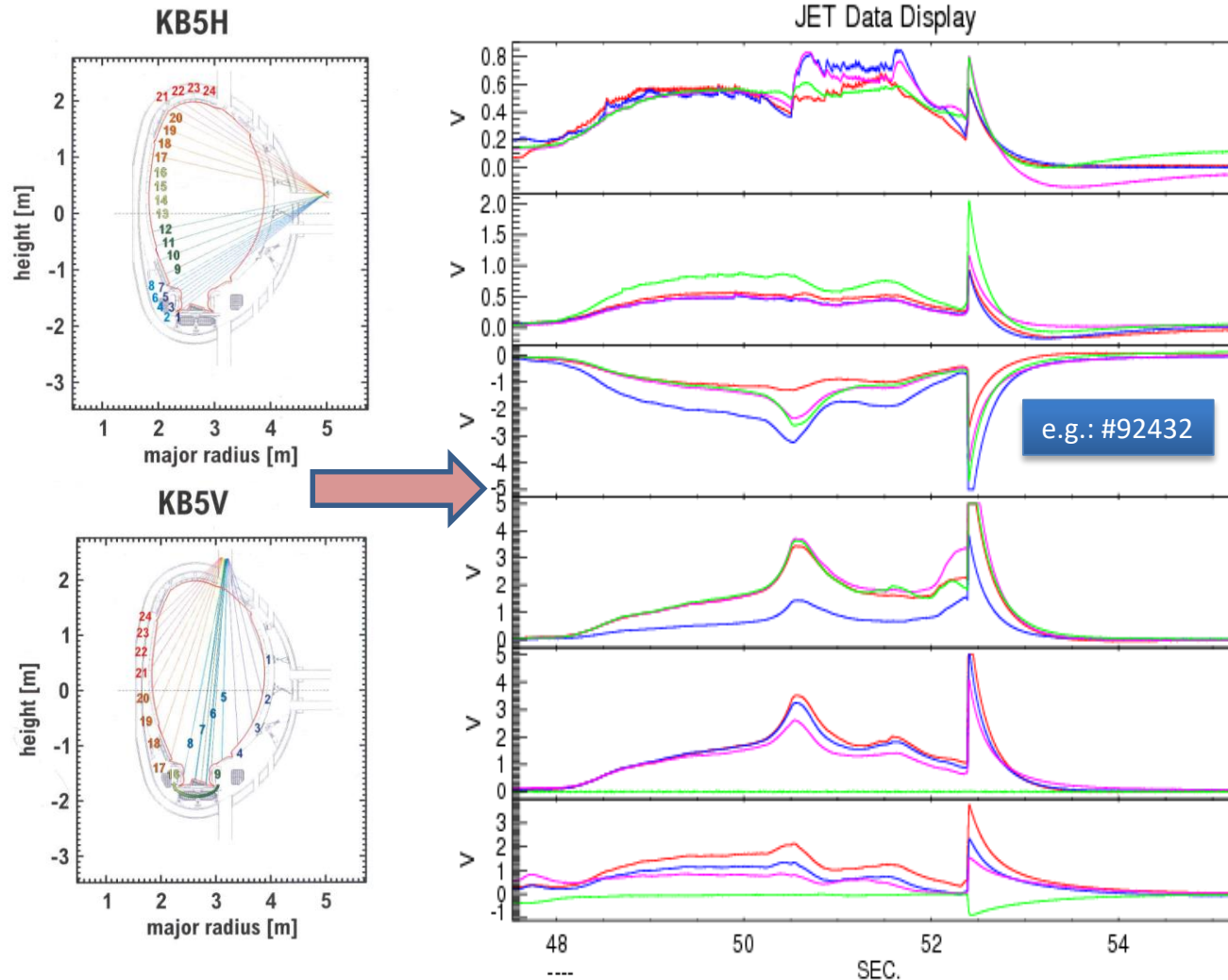
Each camera collects radiation along 24 chords. The spacing of the lines-of-sight has been chosen to give an increased spatial resolution of the divertor region in addition to covering the whole plasma: two fans of eight chords, each span the divertor region with 8 cm separation, while the other 16 channels cover the whole plasma with a coarser resolution.



# Bolometry data analysis



Bolometer analysis is essential to provide results for the further analysis/modeling, therefore the required pulse data will be analyzed by reproducing and creating tomographic reconstructions using KB5 (and KB3) bolometer data.



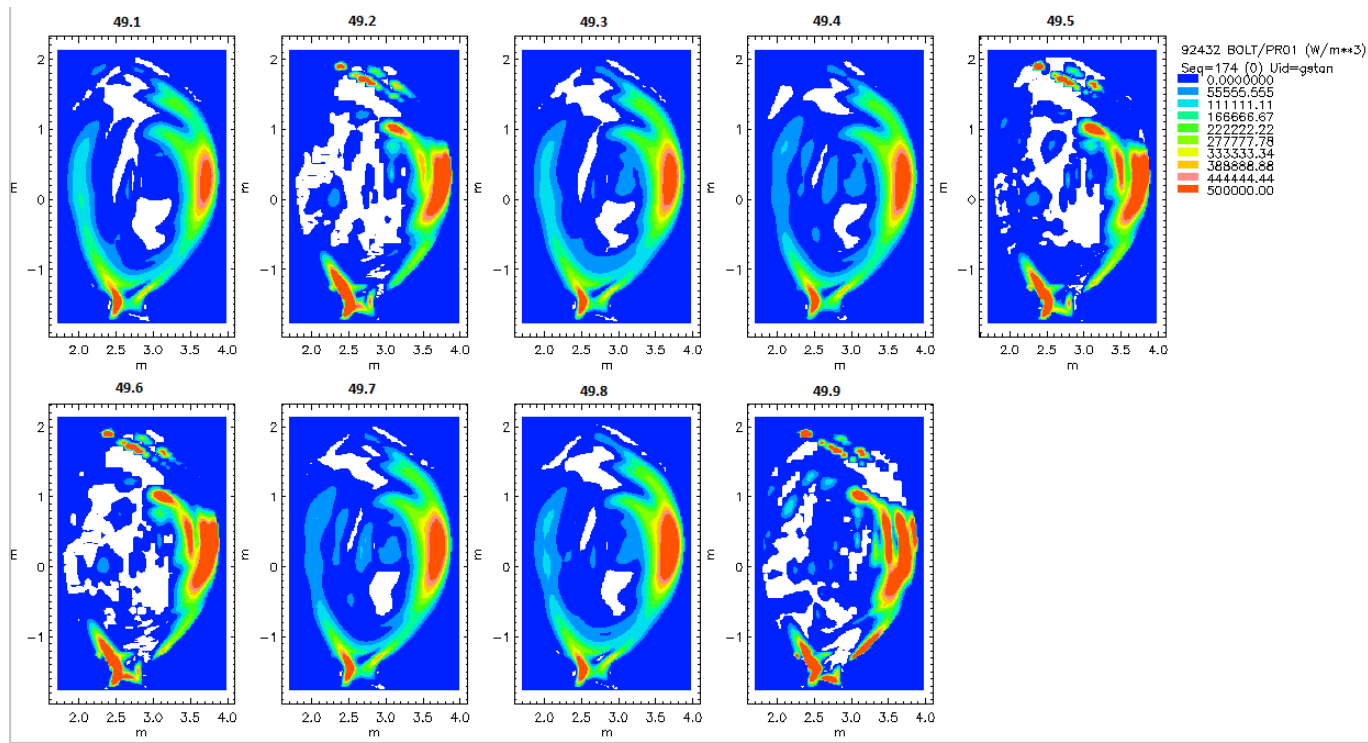
## Analysis steps:

- Usage of bolometer available data.
- Starting data: raw voltages and/or calibrated radiation flux.
- analysis specific to the goals of the deliverable will be performed by extracting the required information
- This analysis provides information to achieve the goals of the deliverable.

# Summary



- In EUROfusion project LEI is involved in JET1 – JET campaigns (since 2014). Participation in JET Campaigns C35, C36 ... up to now (bolometer data analysis and reconstruction).
- Two main-vessel bolometric cameras with horizontal (KB5H) and vertical (KB5V) views of the plasma cross-section provide a substantial capabilities at JET.
- **BOLT – 2D radiation distribution, measured and back/calculated channel data, parameter of reconstruction.**
- **BARA – different integrals of radiated power from reconstruction (e.g. total power TOPO, total radiation within flux surfaces TOIF, etc..).**
- The total radiation as computed via tomography does agree quite well with the total radiation.



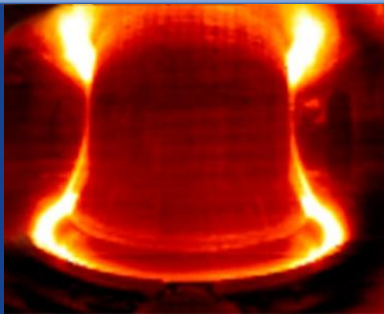


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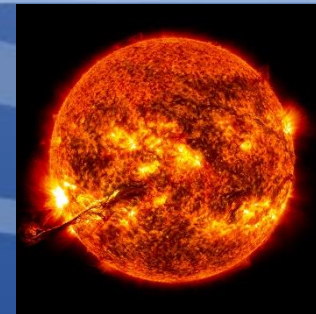
**THANK YOU!**

Gediminas Stankūnas

[gediminas.stankunas@lei.lt](mailto:gediminas.stankunas@lei.lt)



**“A day without FUSION  
is like  
a day without SUNSHINE !”**



**JET**



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