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UK ILC Tracker Meeting
14 October 2015

A member of the Russell Group

Science & Technology Facilities Council

Tracker Mechanics Work

Strongest interest Oxford and Liverpool so far. We had one intermediate phone meeting since last UKLX tracker meeting.

To have a useful outcome at the end of ~18 month initial funding we will focus on the local module supports structure.

I. demonstrate viable mechanical solution for central tracker

- Design of a rigid low mass box section suitable for a ~2m stave (Oxf)
- FEA investigations of this design (Oxf + Liv)
- Investigation how to manufacture such a structure if possible produce some first objects. (Oxf + Liv)

Set up a sharepoint or equivalent for engineering drawings, FEA models, etc

II. Develop a viable cooling solution with sufficient margin to accommodate uncertainty in power consumption due to unknown technology choice. Pursue 2 power/cooling scenarios:

- Relatively high power and thus high cooling capacity solution

  What is lowest mass achievable with distributed liquid/bi-phase cooling? (Oxf)

- Low power air cooling solutions

  What is maximum heat load with air cooling at acceptable flow rates (Liv.)

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Air cooling studies Liverpool

Joost Vossebeld, Tim Jones, Peter Cooke, Peter Sutcliffe,
Matt Gardner (MPHYS project)

Recent work in ATLAS indicates that HL-LHC power level (50mW/cm^2) can be cooled with air forced through open cell, but a high air flow is needed.

For ILC (in layers with timing performance) basic power consumption is similar, but reduced by factor ~200 due to power-cycling

Investigate cooling with air flow over open core carbon foam

We will assume restricted air, flowing inside the box structure.

(Less concern about air distribution in a complex geometric environment)

I. **Develop a test chamber** suitable for optimising air cooling structures (sketch next slide)

II. Measure **cooling performance simple structures** with different foam thicknesses, air temperature, flowrate or air velocity, pressure,..

III. **Develop parametric model** to help the optimisation of a possible cooling solution.

IV. Measure **cooling performance with more advanced solutions** different foams, shapes, ...

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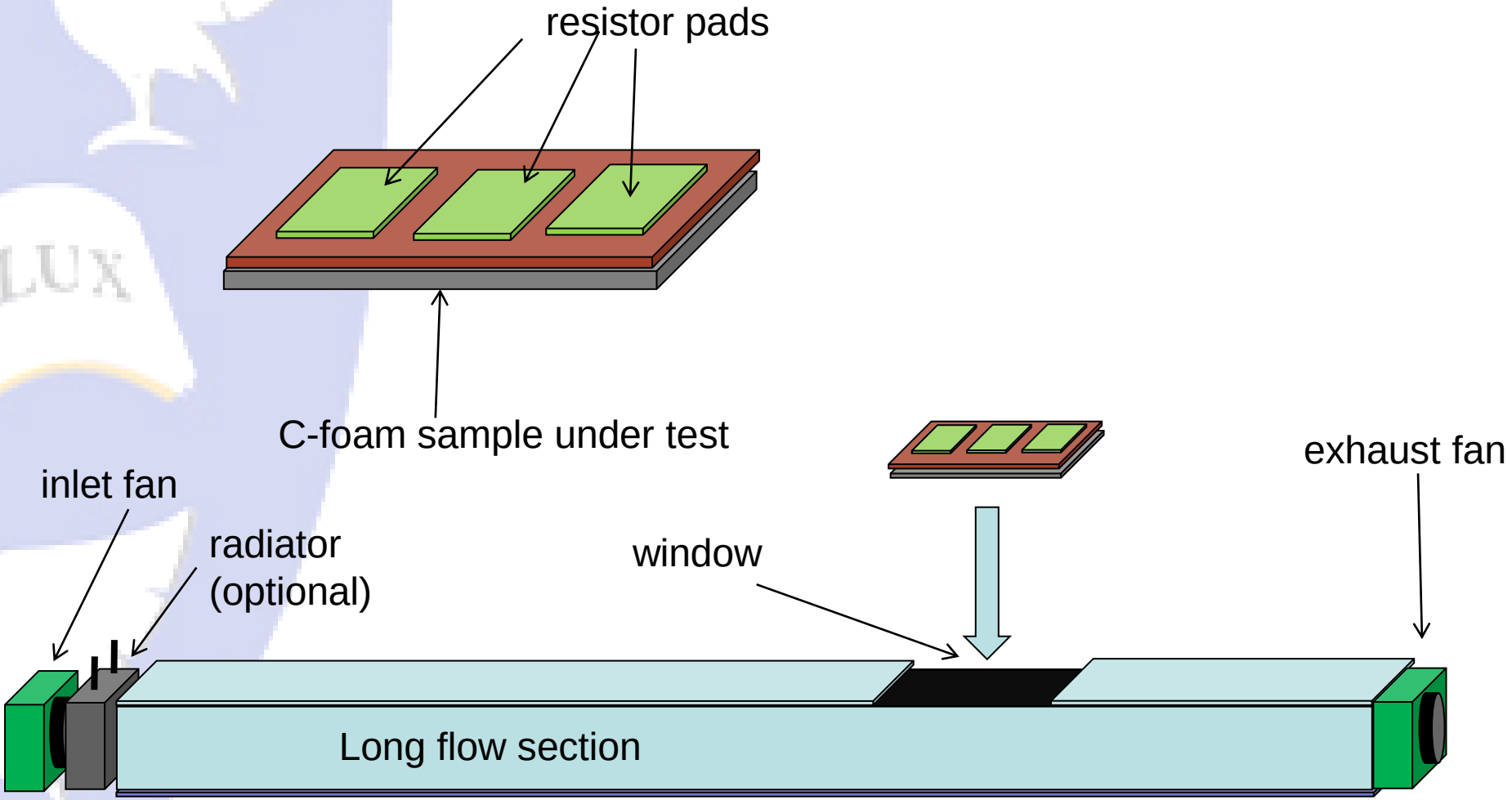
First sketch possible test stand



Equip with sensors to measure temperature, airflow (pressure)

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