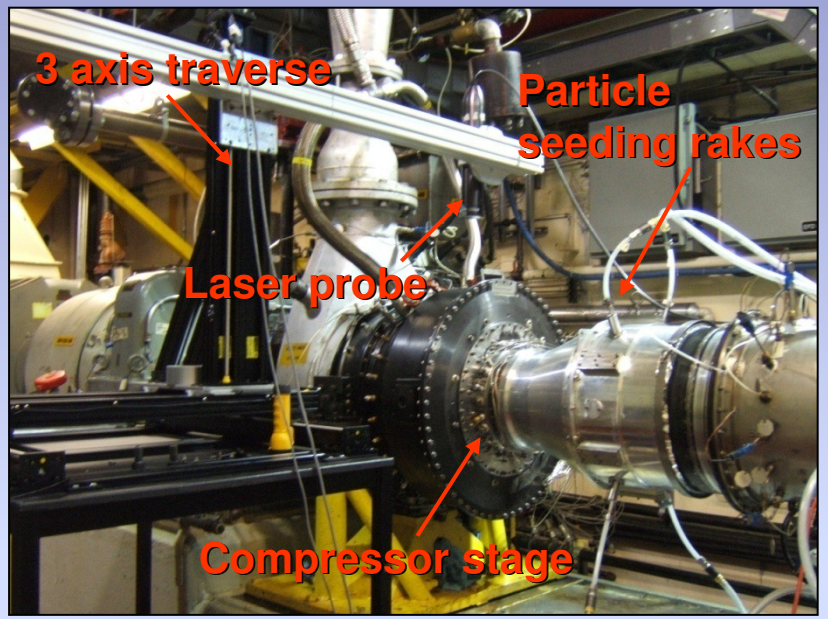
EXPERIMENTAL INVESTIGATION OF A CENTRIFUGAL COMPRESSOR STAGE

Background

Rarely are detailed flow data available from turbomachinery stages due to the difficulty of taking such measurements.

Hence, to validate CFD predictions, design engineers for the stage studied here have had to rely only on pitot rake pressure profiles from earlier studies and measurements of pressures, temperatures, mass flow rate, and in-house empirical models.



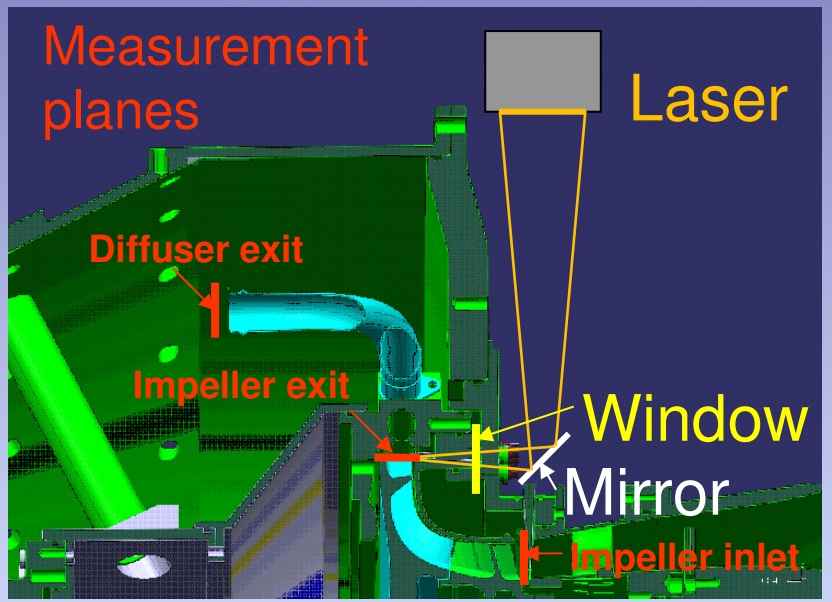
Centrifugal compressor test rig

Objective

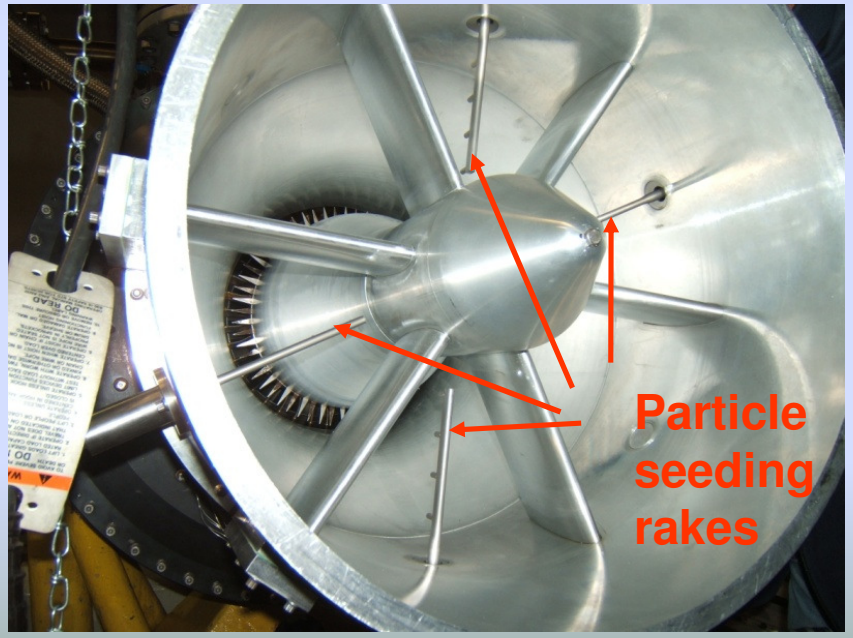
To undertake detailed LDV flow measurements to better understand the flow field and validate CFD modeling of the stage.

Research Being Carried Out

- Detailed LDV measurements at the design speed and flow rate (corresponding to peak efficiency) of the three planes
  1. Impeller inlet
  2. Impeller exit
  3. Diffuser exit



Test rig cross section



Rig intake section with particle seeding rakes

Expected Outcomes

- A better understanding of the flow field that results from coupling the impeller and diffuser components.
- Performance assessment of the numerical methods used during compressor design.