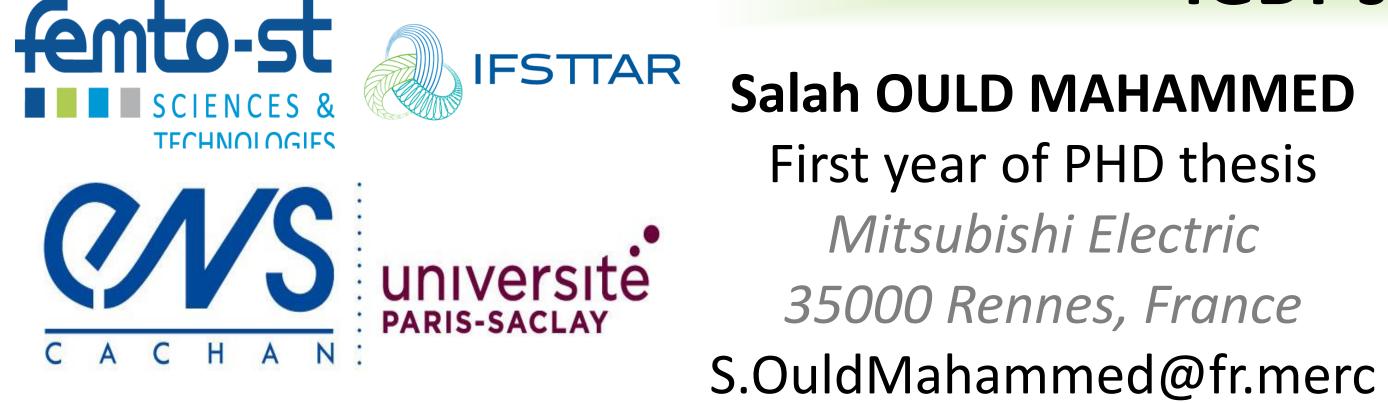


Changes for the Better



# Online Prediction of Remaining Lifetime of IGBT semiconductor Modules



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#### **Student Poster**

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### **Research Objective**

Estimate the remaining useful lifetime of an IGBT during Module operation: Power Power (IGBT, Diode) MOSFET, semiconductor device reliability requirements have increased over the recent years. However, it is needed to improve the safety, the longevity and the life-cycle cost of IGBT power modules and programming an efficient maintenance by estimating the end of life of a device. Hence, This research focuses on the analysis, modeling and exploitation of the on-state voltage in wire-bonded power modules in order to estimate the remaining useful lifetime (RUL) of IGBT power module.

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## **State of Research**

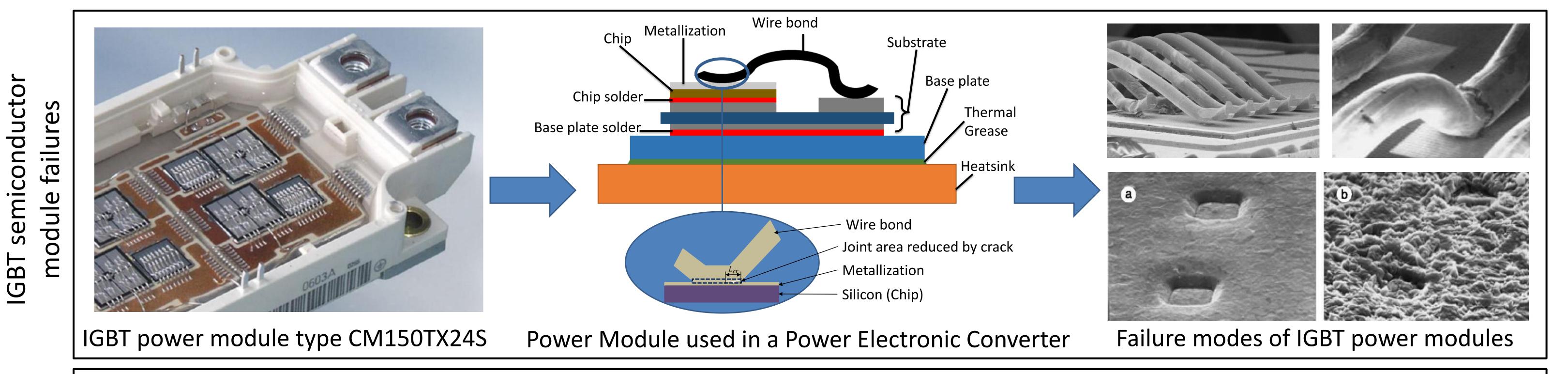
- Study of degradation mechanism and failure modes of IGBT power modules.
- Analysis the on-state voltage of the wire-bond as its evolution reveals information concerning the strength and the state of heath of the device
  General bibliographic on the Prognostic and Health Management techniques that can be applied to complex systems under non-linear and nonstationary working conditions.
  Study of uncertainty related tasks in prognostics Next Steps

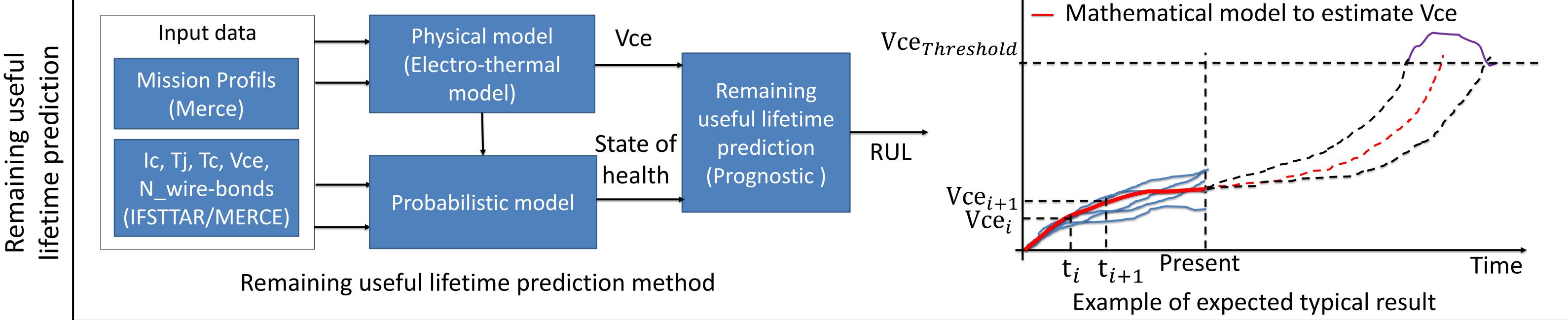
## **Expected Contributions**

- The enabling method is RUL estimation which implies:
- Predict components' degradation evolution of the power module
- Develop a physical model to estimate the degradation of IGBT power module.
- Propose an adapted probabilistic model to predict the degradation evolution in the time.
- The output of the method is the on-state voltage and the remaining useful lifetime of the module.

- Estimate the state of health.
- Estimate the end of life of device.
- Propose a maintenance strategy.
   Research Details

 The probabilistic model allows estimating of uncertainties. Then, RUL and estimation uncertainties interval will therefore be defined.





#### **Acknowledgments and References**

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