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**Master thesis, 2021-2022**

— *Hardware in the Loop tests of a battery in traction mode*—

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**Context**

Electric Vehicles have to progressively replace thermal vehicles to face the Global Warming challenge. But EVs are still limited due to their batteries. Within the framework of the interdisciplinary programme CUMIN (Campus of University with Mobility based on Innovation and carbon Neutrality), L2EP has a Nissan Leaf and will soon receive a battery pack to be tested independently of the vehicle.

Usually simulation studies are performed to predict the thermal and the electrical behavior of batteries in vehicles. For simulation a model is needed. Nevertheless batteries are complex systems and model assumptions lead to errors.

The goal of the HiL (Hardware-In-the-Loop) battery test is to test a real battery in order to get its exact behavior. The rest of the vehicle is simulated in real time. A power HiL interface ensures the link between the two parts.

HiL tests will be performed on battery modules used in an electric vehicle (Nissan Leaf). A comparison will be achieved with measures recorded during driving.

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**Objective**

The objective is to quantify the differences between a HiL test on a module in a lab and the real full size battery behavior in the studied EV.

*Scientific axis of L2EP, control team: Multiphysics modelling; model organization; EV model;*

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**Work steps**

- Simulation of an Electric vehicle
- Hardware in the loop tests with a real battery and the model of the vehicle traction.
- Recording the real battery behavior inside a reference vehicle
- Comparison between HiL results and data records in the studied EV.

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**Key words**

Electric Vehicle; Hardware-In-the-Loop tests; Energetic Macroscopic Representation; Battery testing.

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*Etablissement de votre correspondance*