In this period I’m working mostly in parallel on three main activities.

***Calculation of the analytical impedance of the C-Magnet model***

The analytical impedance of this model of kicker based on Sacherer-Nassibian and Tsutsui formalism was calculated and successfully compared with 3D electromagnetic simulations in the case of perfect matched boundary in the longitudinal plane [1]. To approach the real case I’m working to introduce unmatched terminations. The worst case of open ended terminations will be examined first.

***Electromagnetic simulations of the LHC beam screen including the weld: a new simulation technique***

I simulated the impedance of the LHC beam-screen studying in particular the impact of the weld. In the course of this study, we also developed a special simulation technique called “the scaling technique”, which can be used to obtain the low frequency part of the resistive wall impedance. I proved it in a few simple cases comparing simulation and analytical results [2]. This technique has been used to obtain the low frequency impedance of the LHC beam-screen. The basic idea of the scaling technique approach can be described as follows: if the only contributions to the impedance were the lossy walls we could keep the same electromagnetic configuration scaling by the same factor all the geometrical parameters and the penetration depth. In this way we can simulate a longer wake, and therefore reach lower frequency, in a computationally affordable manner. Then, putting together different simulations (different ranges of frequency) we can obtain the broadband impedance of the DUT (device under test). I also started some resistive wall calculation based on the concept of equivalent conductivity to have a qualitative analytical behavior of the beam screen impedance including the weld.

***Study of a new method for the electromagnetic (EM) materials characterization***

The theoretical model is very intuitive and results from the basic transmission line theory. A coaxial line is filled with the material under investigation with one port closed on a well-known load. The properties of the material are obtained from the measured reflection coefficient at the other port by using it as input for the model. In addition, 3-D electromagnetic simulations will be used in order to setup and validate the measurement system [1].

**References**

[1] C. Zannini. [*Status of the EM simulations and modeling of ferrite loaded kickers*](https://emetral.web.cern.ch/emetral/ICEsection/Meeting_20-10-10/ICEmeeting_20102010.pptx)*.* Presented at the CERN ICE section meeting, 20 October 2010.

<https://emetral.web.cern.ch/emetral/ICEsection/Meetings.htm>

[2] C. Zannini, E. Métral, G. Rumolo. “Electromagnetic simulations of the LHC beam screen including the weld”, CERN-BE-Note, to be published.