Master Thesis

Research-related and Interesting

Exploring Potential Hazards of THz Radiation on European Honey Bees

THz technologies in vast ranges from communication to bioimaging are developing rapidly and various devices radiating in THz range, namely from 100GHz up to 2THz, are being developed . Such rapid growth, raise the safety issues of THz radiation exposure both for humans and other species. This concern is particularly important for insects, as their sizes are both smaller than human and also are in the same order of magnitude as THz wavelengths. Hence, insect exposed to THz radiations can both absorb more energy, which is higher than the safe limit and also show resonances due to their small body size which can act as a dielectric cavity. In this regards, studying the effect of THz exposure on insects seems vital and requires a detail knowledge of the insects anatomy, as well as the permittivity and conductivity of insects in THz ranges. As honey bees are of great importance for environment, and are in-danger, the first case study of insect exposure is on European honey bees.

Correspondingly, and under the project of THz environmental monitoring, we intend to study the European honey bees exposure under THz radiation, and determine their skin depth. First a homogenized honey will be modeled and the skin depth together with the generated heat within the insect under various radiation powers will be measured. Analysis of the data should provide insights on the THZ exposure limit for insects. Afterwards, the vital organs of the insect e.g. heart and brain will be included within the model to measure the amount of absorbed power within them and also study the possibility of resonances.

The current master project will deal with the simulation of the European honey bee under THz radiation using the FDTD based simulation software Empire XPU. The skin depth of the underlying insect has to be determined and compared with the penetration depth of THz radiation on human skin tissue.

Got curious? simply contact us for an informal meeting discussing the topic or send a thesis request per email to us.

Requirements:	Knowledge of electromagnetic field theory, interest in modelling and simulation of electromagnetic systems and bioelectromagnetics, knowledge of numerical simulation is preferred.
Character of the project:	40% Theory / 60% Simulation
We offer:	An interesting master project at the edge of science in a friendly research environment.
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