Bacteriophages, often called phages, are bacteria infecting viruses. They are in balance in the bacterial world, being the most abundant organisms on the Earth. A significant feature characterizing bacteriophages is their high specificity against the host (bacteria) and the possibility to lyse the host cell (e.g., pathogenic bacteria) in the lytic cycle that allows the creation of progeny phages through the cell lysis of bacterial host.

Intensive works on the application of phage solutions begun in thirties and forties of the last century. This period was simultaneous with ‘the golden age of antibiotics’, *i.e.* the dynamic development of antibacterial substances – microbial secondary metabolites that act on cell structures or microbial metabolic processes, inhibiting their growth and fissions. Currently, because of the excessive use of antibiotics, resistant bacterial strains which are life-threatening to humans have emerged. It is estimated that until the year 2050, fifty million people will die from the infections caused by antibiotic resistant bacterial strains. Therefore, since the beginning of 21st century there is a growing interest in bacteriophages, and the solutions that are based on these viruses, that have application in medical therapy.

From the scientific point of view, a particular attention should be put on studies regarding the research on interaction between a phage and its host (bacterium), the application of bacteriophage solutions, the physicochemical properties of bacteriophages, developing new fields of phage application in genetic engineering (as vectors or for the construction of genetic and peptide libraries) and for identification and typing of bacteria (tests to detect specific bacterial strains), as well as their use in nano-medicine (drug transporters, antitumor therapy) and in the production of proteins.

It should be noticed that besides the wide spectrum of application of bacteriophages and phages solutions, the process of their production is based on the use of bioreactors equipped in mechanical stirrers. The analysis of source literature and patent databases showed that the only possible modifications associated with the process of bacteriophages production require a change in the process regime or the optimisation of the process depending on the selection of optimal set of operational parameters with the use of mathematical methods, which allows to obtain satisfactory parameters describing the host-phage kinetics.

Taking into account the interests in applying bacteriophages and phage solutions, and discerning the downsides of proposed technological solutions associated with the production process of such formulations, the interdisciplinary research team sees the possibility to propose a new solution based on the use of magnetically supported production process. Based on the conducted preliminary studies that confirmed the possibility to apply the rotating magnetic field (RMF) in the process of bacteriophages production, it was observed that RMF influences the developmental cycle in bacteriophages leading to the increase in the quantity of produced virions, the acceleration of phages adsorption to the cell surface and the increase in their lytic efficacy.

The research objective of this project is to evaluate the influence of force fields other than RMF (static magnetic field, time-varying magnetic field) on the processes associated with the activity of bacteriophages against their hosts, as well as the physicochemical changes on the surface of the bacteriophage and the host. Furthermore, the influence of these fields on the activity of complex bacteriophage solutions will be analysed in the context of their efficacy, stability, antibiofilm activity, and *in vitro* activity in therapy on the greater wax moth model (*Galleria mellonella*).