

Modeling a zombie outbreak

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“Mathematical modelling is the art of capturing natural phenomena of real life in the mathematical equation.”

Project statement:

In space- and astrophysics, we normally have to solve complex partial differential equations using a variety of numerical methods. Cosmic ray propagation is, as an example, described by a diffusion equation, where the diffusion coefficient can, in the most general case, be a non-linear function which depends on the solution itself.

In this project we propose not so solve the more complicated and multi-dimensional cosmic ray propagation equation, but a simpler version that describes the outbreak of a zombie infection. The necessarily sets of differential equations needs to be set up, with coupled source and sink terms, along with realistic approximations of the required transport coefficients. These expressions will then have to be solved numerically for a variety of model set-ups with increasing complexity.

Student development and recommended skills:

During this project, the student will solve a set of coupled diffusion equations numerically. These equations will have to be derived, along with the required numerical coefficients.

An aptitude for mathematical modeling, and the numerical implementation thereof, is recommended.