

### Project-based research

<b>Project Name:</b>	The weak KAM perspective for the large deviation rate function	<b>Project ID:</b>	Leave Blank
<b>Supervisor:</b>	Yuan Gao	<b>Number of Positions</b>	2
<b>Project Description:</b>	<p>The classical Kolmogorov-Arnold -Moser (KAM) theorem studied the existence of quasi-periodic solution of a perturbed integral system via find a canonical map converting original phase to action-angle variables. The weak KAM theory also use the solution of the stationary Hamilton-Jacobi equation, in a variational representation, to study the important properties of a dynamic system including the least action curves and the Aubry/Mather set. From the weak KAM perspective, the good rate function in the large deviation principle for a family of invariant measures not only provides a globally defined weak KAM solution but also helps to characterizes the action-minimizing measure (Mather measure) and the corresponding least action curve at each states. This project will use a one-dimensional irreversible chemical reaction process to explicit compute and illustrate the above deep connection, as well as the associated essential concepts in the weak KAM theory.</p>		
<b>Final Deliverables:</b>	Project report (in terms of presentation, or project statement, or illustrative simulations)		
<b>Weekly Working Hours</b>	4 hours		
<b>For Credits/Voluntary</b>	Both		
<b>Desired Qualifications</b>	<p>Required: Knowledge of ordinary differential equations and basic probability</p> <p>Preferred: familiar to computational software, for instance Matlab, Python or others.</p>		