

# Non-Gaussian Likelihoods for Gaussian Process Regression

## Master's Thesis

A Gaussian process (GP) is a supervised machine learning method that naturally provides an uncertainty measure on the prediction. Its objective is to approximate an unknown input-output mapping using observed data. To obtain a good mapping, the optimization of hyperparameters is crucial. In general, one assumes that the observed data underlies a Gaussian distribution. That way, it is convenient to calculate the posterior inference.

If the observed data is subject to other distributions, e.g., logistic or student's t-distribution, an approximation of the posterior inference is necessary.

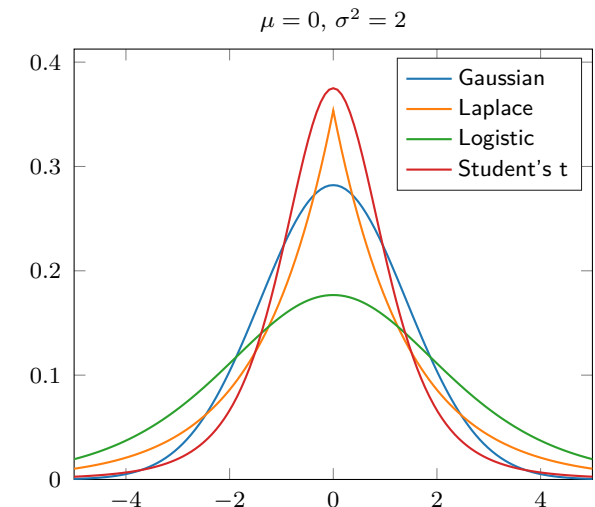
Your tasks will be:

1. Literature review on non-Gaussian likelihoods for Gaussian process regression
2. Implementation of posterior inference approximations for Gaussian processes in HILO-MPC<sup>1</sup>
3. Application to case studies / in a control setup

Experience with /  
knowledge about: Gaussian process regression, Bayesian statistics

Programming skills: Python (good to very good skills required)

Language: English (thesis and presentation), German



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<sup>1</sup> [https://www.ccps.tu-darmstadt.de/research\\_ccps/hilo\\_mpc/index.en.jsp](https://www.ccps.tu-darmstadt.de/research_ccps/hilo_mpc/index.en.jsp)