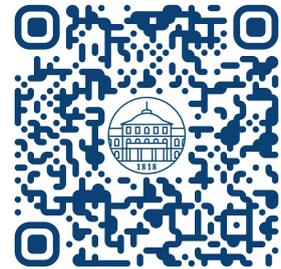




## Master's Thesis

on the topic of:

### „Machine learning-based modeling of spray drying processes using dimensionless quantities“



#### Motivation

Spray drying is an established process for manufacturing powdered products from liquid raw materials. However, model-based prediction of process and product parameters remains a challenging task, especially for new products or when plant conditions change. Previous attempts to predict product parameters using machine learning (ML) have shown that accurate predictions are possible with a sufficient data basis, but they reach their limits when extrapolating to process conditions that have not yet been observed.

One approach to improving generalizability is the targeted integration of dimensionless quantities as input variables. These reflect the underlying physical relationships and enable data-driven ML algorithms to be trained in such a way that physically plausible and consistent predictions can be made even outside the available data space.

#### Objectives

The main objective of this thesis is to develop an ML-based modeling strategy that describes spray drying processes using dimensionless quantities.

As part of the thesis, relevant dimensionless quantities will be identified, derived, and made usable for modeling. Based on this, an existing data pipeline for spray dryer data will be expanded and adapted. The performance of the developed models will be evaluated using existing measurement data. Particular attention will be paid to investigating the extrapolation capability and physical consistency of the model predictions in comparison to conventional ML approaches.

#### We offer

- Innovative work in the field of food processing digitization
- Innovative research in the field of ML and spray drying
- Excellent working environment and close supervision

#### Contact

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