## Background

The "**ON** Cerco-Project", funded by the German Research Foundation (DFG) and hosted by the Institute for Sugar Beet Research and the Stachniss Lab for Photogrammetry & Robotics at the University of Bonn, is advancing plant disease modeling by leveraging **O**blique and **N**adir drone observation angles for studying plants under pathogen stress. While current remote sensing studies, in digital plant pathology and beyond, still rely on straight-down data collection, ON Cerco breaks new ground by studying multi-angular reflectance data. This innovative approach, particularly beneficial for dicotylous cultivars like sugar beet, where leaves grow more upright and rosette-oriented, is likely to enhance disease quantification models. The inclusion of oblique angles allows for a comprehensive evaluation of pathosystems (pathogen + host + environment) capturing disease patterns on both, the upper and lower leaf surfaces. This promises to provide new insights in plant disease dynamics and will elevate disease management strategies in agriculture and plant pathology.

## Goal

• Developing an image processing approach that a) allows for unbiased radiometric properties and b) allows to access the full range of spectral data from the available zenith and azimuth angles.

## Tasks

- Understand the difference between spectral signatures that have been collected from nadir and oblique observation angles.
- Develop an image pre-processing workflow to unbias spectral data.
- Extract spectral data from all available observation angles and optimize run-time for very large tabular data (> 1 mio rows)
- Optional: Obtain a UAV licence to collect multi-angular data for optimizing current standard flight patterns in vegetation science.



heim@ifz-goettingen.de

