Workshop: **Nonparametric Analyses of complex time-to event data**
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Abstract:

The Cumulative Proportional Odds Model for the Cause-Specific Hazards of Competing Risks

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Although the proportional odds model is well known within many different fields of research, it has rarely been used to analyze the cause-specific hazards of competing risks data. We focus on a competing risks setting with two opponent event types, such as patients entering the study in a critical state of health and either experience improvement or worsening of their health status. The underlying assumption of a cumulative proportional odds model is that if a risk factor affects a patient's health status, this influence is to the same degree but in the inverse direction with respect to both event types. This effect is represented by only one regression coefficient for both the odds of worsening as well as the odds of a patient's improvement. This is in contrast to the well known proportional cause-specific hazards model, where effects are modelled separately for each event type.

Our aim is to investigate the cumulative proportional odds model in a competing risks setting, assuming proportional odds in terms of cause-specific hazard rates. The method of partial likelihood for the proportional cause-specific hazards model enables to estimate the regression coefficient without further investigation of the unknown cause-specific baseline hazard. Estimation becomes more involved assuming proportional odds, as in this case the unknown baseline odds do not cancel out. We use Nelson-Aalen estimates for the baseline cumulative cause-specific hazards in order to maximize the likelihood function with respect to the unknown regression coefficient. Making use of the estimated regression coefficient, model-based cumulative cause-specific hazard as well as cumulative incidence function can be computed. For illustration we analyse data from the SIR 3 cohort study, where interest is in the investigation of outcome in patients on intensive care unit.