



**Master's Thesis Title:** 'Investigating the Uses and Applications of 3-D Synchronous Front Facing Fluorescent Spectroscopy in the Analysis of Still and Sparkling White Wines via Fluorescent Fingerprinting to aid in the Identification of Amino Acids, Proteins, and Various Other Compounds'

<b>Student name:</b>	<b>Alanna Gail Robinson</b>
<b>Institution/Company involved:</b>	<b>Hochschule Geisenheim University Melbourne University</b>

**Jury members (name/position):**

<b>Ludwig Pasch, M.Sc., Hochschule Geisenheim University</b>
<b>Prof. Aude Vernhet, Montpellier SupAgro</b>
<b>Dr. Kate Howell, University of Melbourne, FVAS</b>
<b>Prof. Trevor Smith, University of Melbourne, Chemistry</b>
<b>Prof. Dr. Manfred Stoll, Hochschule Geisenheim University</b>
<b>Dr. Matthia Schmitt, Hochschule Geisenheim University</b>

**Names and emails of supervisors:**

<b>Ludwig Pasch, M.Sc., Hochschule Geisenheim University</b>	<b>Ludwig.Pasch@hs-gm.de</b>
<b>Prof. Aude Vernhet, Montpellier SupAgro</b>	<b>aude.vernhet@supagro.fr</b>
<b>Dr. Kate Howell, University of Melbourne, FVAS</b>	<b>khowell@unimelb.edu.au</b>
<b>Prof. Trevor Smith, University of Melbourne, Chemistry</b>	<b>trevoras@unimelb.edu.au</b>

**Date and location of the oral examination (if known):** November 27, 2017-Hochschule Geisenheim University

**Confidential:**  Yes  No

**Abstract (max 300 words):**

**Topic position and objectives:** Wines throughout the world differ vastly due to effects from the climate, terroir, the grape varietal or blend that is being produced, and ultimately stylistic winemaking choices that are made during the fermentation process. The identification and analysis of a wine can offer important insights to the quality of a wine, its ability to age well, as well as Typically, wines can be superficially identified and analyzed by someone with an experienced palate and knowledge of various wine regions with more in depth, and often times destructive, laboratory analysis revealing more detailed information about the structure of a wine. However, delving into the fluorescent chemistry and subsequent analysis via PARAFAC modelling, of wines to see their fingerprints can divulge a vast quantity of precise, chemical information about the wine, such as its place and method of production as well quantifying the concentrations and identifying various proteins, amino acids, polyphenols, and other fluorophores that are present in wines, without damaging the integrity of the sample. This experiment aims to prove that 3-D front-facing synchronous fluorescence spectroscopy (SFS) is a useful, efficient tool and an inexpensive process when it comes to analyzing white wines, both still and sparkling, with potential applications for analysis of red wines as well. Wines can have similar chemical fluorescent fingerprints, which

contributes to their similarities in aromatics, mouthfeel, and palate. 3D front-facing fluorescence spectroscopy allows for wines to be tested with no alteration to the sample and when coupled with PARAFAC modelling and analysis reveals an excess of exploratory and explanatory information about the wines and their subsequent components and compositions.

**Methods:** Using 3-D Synchronous Front Facing Fluorescent Spectroscopy and PARAFAC modelling to identify the main proteins and compounds present in still and sparkling white wines.

**Results:** Using fluorescence spectroscopy and PARAFAC modelling two models were made for two wine data sets. Both models were validated and subsequently identified the main components present in the wine samples.

**Main conclusions:** Fluorescence spectroscopy is a viable tool for identifying various wine compounds and has many further applications that can be explored.

**Keywords (5):** Fluorescence spectroscopy, PARAFAC, Wine, Protein, Analysis