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Class of 2018

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PROTEUS



THE UNIVERSITY *of* EDINBURGH
School of Chemistry

Project Overview

- ▶ Discerning between cell populations using Raman Spectroscopy and Principal Component Analysis
- ▶ Resolving organelles in cancer cells
- ▶ Surface-enhanced Raman Spectroscopy of neutrophils and timing uptake/endocytosis
- ▶ Laser and Raman system optimization
- ▶ Majority of work took place at The Royal Infirmary
- ▶ Campbell Lab Group and Proteus Team



Queen's Medical Research Institute at the The Royal Infirmary



One of the Proteus labs



Raman Spectroscope



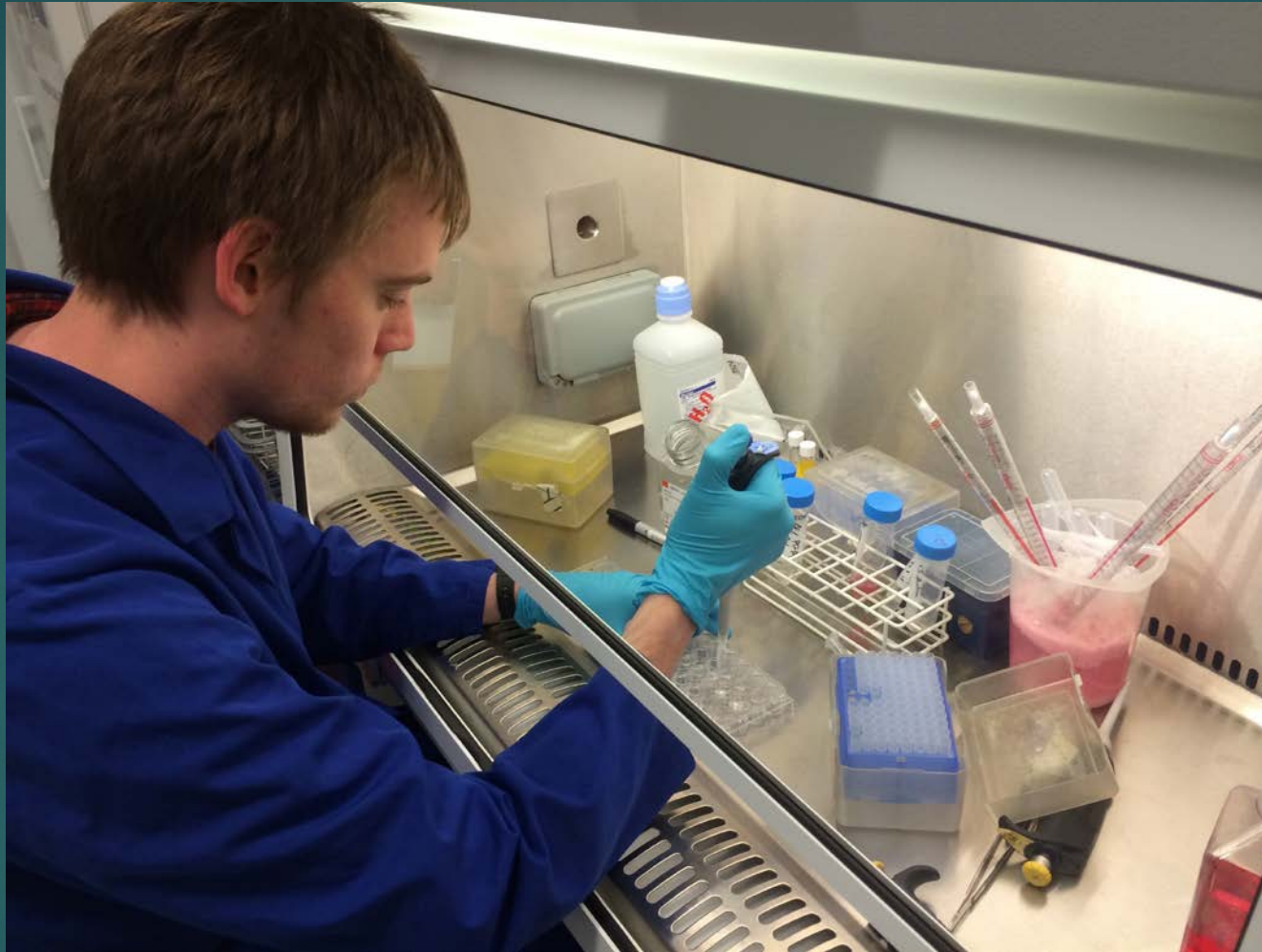
785 nm laser



532 nm laser

Rewarding Environment

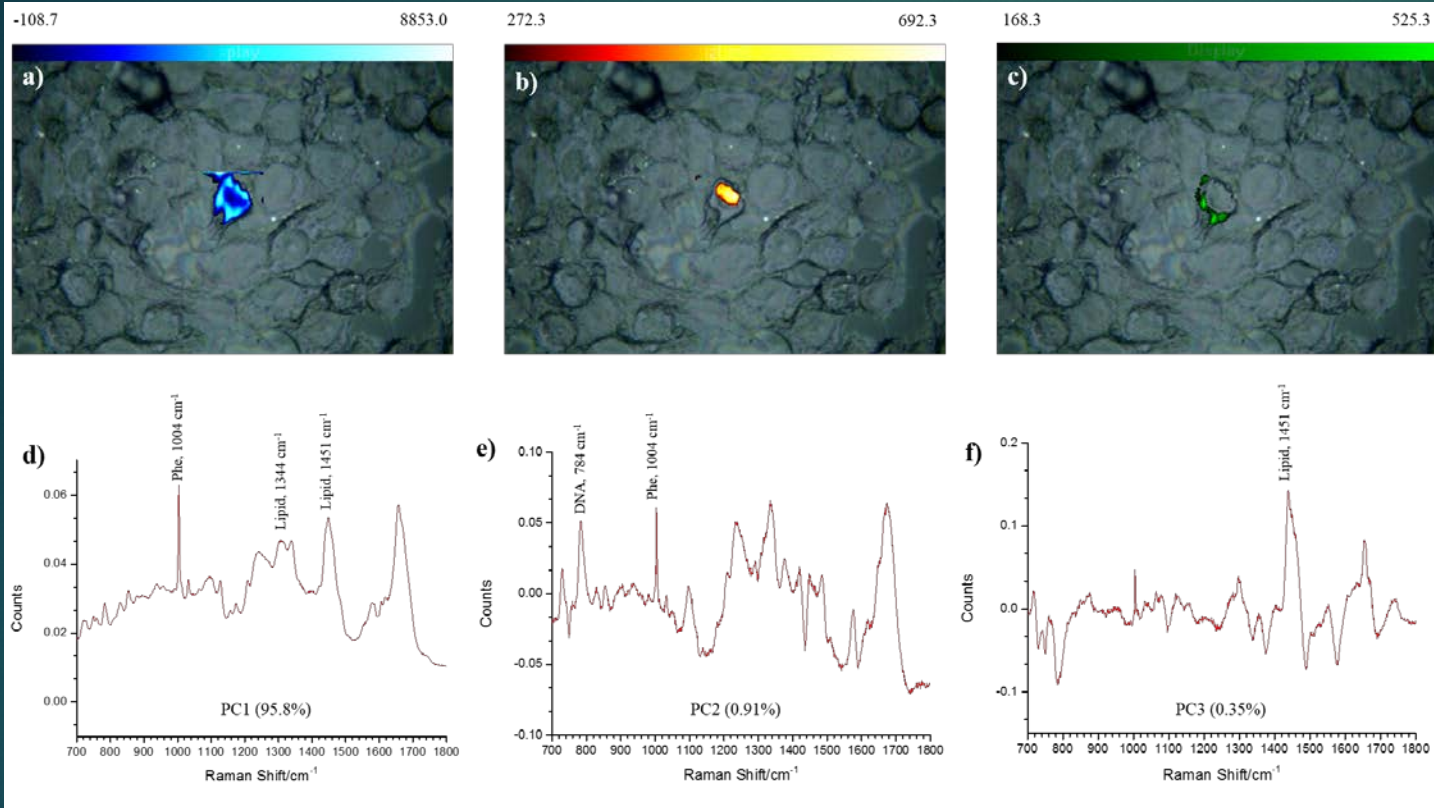
- ▶ Surrounded by professionals of many different backgrounds (Chemists, Biologists, Clinicians, Physicists, Astrophysicists, Programmers, Engineers)
- ▶ Good exposure to graduate school studies and responsibilities
- ▶ State-of-the-art facilities and equipment
- ▶ Access to high value resources for research (gold particles, gold Nano shells, deuterated substances)



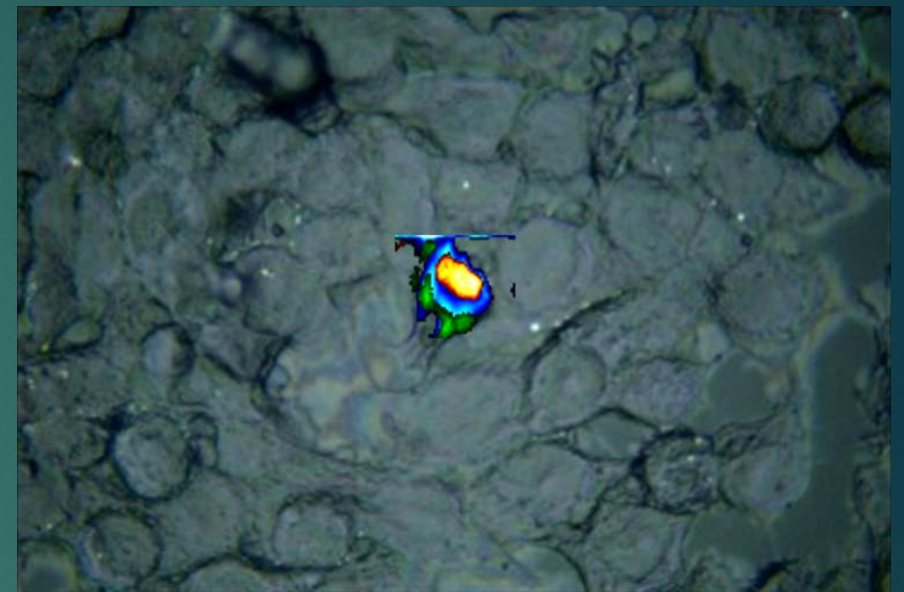
Graduate student, Joe Wilson, adds gold particles labeled with Mercaptobenzoic acid

Role of my Research

- ▶ Optimize Raman system settings for integration with Proteus fiber
- ▶ Perfect acquisition methods for differentiating between white blood cells in various stages of life
- ▶ Obtain Raman spectra for cells in real-time
- ▶ Identify organelles within cells in real-time using Raman Spectroscopy and PCA
- ▶ Mathematically identify cells in apoptosis



First 3 principal components (individual) of an MCF7 cancer cell



Combined principal components

Going Forward

- ▶ Had the opportunity to talk with professionals from an interdisciplinary research group
- ▶ Pursuing a concentration in Astrophysical Sciences
- ▶ Discussed with Chemists and Physicists
- ▶ Strengthened foundation in independent research and writing reports

Beautiful Country, Beautiful Culture

