Aaron Webster

awebster@falsecolour.com https://falsecolour.com/aw
1 541 357 9546

Education

Ph.D., Physics 2014 (expected)
Max Planck Institute for the Science of Light, Erlangen, Bavaria, Germany
Dissertation: *Interference and Scattering in Surface Plasmon Resonance*

Master of Science, Theoretical Physics: Optics 2011
Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Bavaria, Germany
Thesis: *Ultrashort Pulses in Focal Regions*

Master of Science, Applied Physics: Optics 2009
University of Oregon, Eugene, Oregon, USA

Bachelor of Science, Physics
University of Oregon, Eugene, Oregon, USA 2007

Research Experience

Max Planck Institute for the Science of Light Dr. Rer. Nat. Frank Vollmer 2011-present
Graduate student, theoretical and experimental. Research on ultrasensitive biodetection using mesoscopic properties of surface plasmon polariton scattering and new applications of quartz crystal microbalances.

- ◇ Discovered and implemented new mechanism for nanoparticle detection in surface plasmon resonance.
- ◇ Conducted significant research regarding quartz crystal microbalances in centrifugal force fields, leading to a novel type of instrument (see Patents).
- ◇ Successfully designed and carried out experiments involving advanced biochemistry: oligonucleotides, lambda DNA, self assembled monolayers, and functionalized nanoparticles.

Friedrich-Alexander-Universität Erlangen-Nürnberg Professor Norbert Lindlein 2010-2011
Master student, theoretical. Work included theoretical modeling and cluster distributed numerical simulation of ultrashort pulses in the focal region of high numerical aperture optical systems.

- ◇ Wrote a highly parallel cluster implementation of a discrete Fourier transform for fast computation of focussed fields.

University of Oregon Professor Stephen Gregory 2009-2010
Guest researcher, theoretical. Numerical simulations of surface plasmon polariton multiple scattering using apertureless near-field probes.

Light Beam Industries, Eugene, Oregon, USA 2007-2009
Senior technician, research and development, optics and electronics. Designed and integrated digital and analog circuitry for power, control, and thermal management of the company's LED based optical products.

- ◇ Produced fifteen different documented printed circuit boards. Five in production, three board revisions, zero functional mistakes. Topology includes microcontrollers, power management, data acquisition and communication.
- ◇ Designed and constructed a one meter diameter integrating sphere for accurate photometry measurements.

Boise Technology, Nampa, Idaho, USA 2007
Research assistant, experimental. Studied organic/aqueous (biphasic) solvent systems in order to further understanding of the chemistry related to chemical warfare decontamination.

- ◇ Designed and built a Lewis Cell for stirred, biphasic UV-Vis experiments. Device included the creation of a custom low turbulence impeller stirrer.

University of Oregon Professor Dan Steck 2005-2007

Undergraduate research assistant, experimental. Designed and constructed many scientific instruments to assist in ongoing atom optics research.

- ◇ Designed and built a one meter long scanning Michelson interferometer to measure detuned lasers with resolution of about 1 in 10^6.
- ◇ Constructed a superior quality low noise, high-speed single/differential photodiode detector.
- ◇ Built and tested a high vacuum housing for an avalanche photodiode capable of single photon detection.
- ◇ Made an economical tunable extended cavity diode laser of appreciable quality used for undergraduate research.

Publications

- ◇ Aaron Webster, Frank Vollmer, and Yuki Sato. "Probing biomechanical properties with a centrifugal force quartz crystal microbalance". In: *Nature Communications* (Oct. 21, 2014)
- ◇ Aaron Webster and Frank Vollmer. "Interference of conically scattered light in surface plasmon resonance". In: *Optics Letters* 38.3 (2013), pp. 244–246

Patents

- ◇ Aaron Webster et al. Provisional; PCT Filed 3196.034PRV. Sept. 18, 2013

Students Supervised

- ◇ Jiapeng Huang (Master) 2013-2014
  Thesis: *Speckle Detection of Surface Plasmon Polaritons*

Related Experience

Computer

- ◇ Languages: C, MATLAB/Octave, Perl, Bash (proficient), C++, Python, PHP, SQL (experienced).
- ◇ Adept with Linux, OS X, and Windows operating systems.
- ◇ Physics programing projects include Fourier analysis, optimization algorithms, process control (PID) loops, finite-element analysis.
- ◇ Experience programming with large datasets in parallel and cluster environments (MPI on Beowulf clusters, CUDA/OpenCL, pthreads).

Electronics

- ◇ Proficient with microcontrollers (AVR) and embedded devices.
- ◇ Designed and worked with analog, digital, and mixed topologies.
- ◇ Experience with small to medium scale PCB manufacturing: surface mount components, reflow soldering, testing.

Fabrication

- ◇ Experience machining countless parts; vacuum components, optical mounts, lenses.
- ◇ Ability to operate both manual and CNC milling machines, lathes (Haas, Bridgeport) and laser systems (Epilog). Familiarity with CAD/CAM softwares (Solid Edge, Mastercam) to generate machine code.
- ◇ Fabrication with TIG, MIG, stick-arc, and oxy-fuel cutting and welding.
- ◇ Other experience includes spin coating, sputtering.

Languages

English (native) German (CEF B1, conversational) Spanish (CEF A2, good)