Svenja Akkira Knappe

Education

2001: PH.D. in Natural Sciences (Physics) - Rheinische Friedrich-Wilhelms-Universität, Bonn, Germany
Dissertation: " Dark Resonance Clocks and Magnetometers"
Second Subject: Nuclear Medicine
Advisor: Robert Wynands

2000: Correspondence Degree in Medical Physics - University of Kaiserslautern, Germany

1998: Diploma in Physics - Rheinische Friedrich-Wilhelms-Universität, Bonn, Germany
Diploma Thesis: "Polarization-Sensitive Photon-Correlations of Single Cs Atoms in a MOT"
Advisor: Dieter Meschede

Professional Experience

UNIVERSITY OF COLORADO
DEPARTMENT OF MECHANICAL ENGINEERING — 2017 - PRESENT
BOULDER, CO USA
Associate Research Professor (2017 - 2022)
Research Professor (2022 - present)

FIELDLINE MEDICAL — 2017 - PRESENT
BOULDER, CO USA
Founder & Chief Technology Officer (CTO)
Commercialization of a functional brain imaging system based on quantum magnetometers.

FIELDLINE INDUSTRIES — 2022 - PRESENT
BOULDER, CO USA
Founder & Chief Technology Officer (CTO)
Commercialization of magnetic imaging systems based on quantum magnetometers.

QUSPIN INC. — 2016 - 2017
LOUISVILLE, CO USA
Senior Scientist
Commercialization of small atomic devices, e.g., optically-pumped magnetometers.

UNIVERSITY OF COLORADO
DEPARTMENT OF PSYCHOLOGY AND NEUROSCIENCE — 2013 - PRESENT
BOULDER, CO USA
Associate Professor Adjunct
Research on microfabricated optically-pumped magnetometers for MEG

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) — 2003 - PRESENT
BOULDER, CO USA
Project Leader

Projects

2004 - 2016 — Chip-Scale Atomic Magnetometry

- Investigate fundamental limits to optical magnetometry in millimeter-size vapor cells

- Developed portable magnetometer prototype systems and measured biomagnetic signals of the human heart, muscles, nerves, and brain at the Physikalisch-Technische Bundesanstalt (PTB) Berlin, Germany
- Nuclear Magnetic Resonance (NMR) system, remotely detected with micro-magnetometer in collaboration with University of California at Berkeley
- Develop new MEMS fabrication methods to improve chip-scale atomic magnetometers
- Develop wafer-level fabrication of chip-scale atomic magnetometer sensor heads in collaboration with Charles E. Draper Labs
- Small low-cost magnetometers for magnetic anomaly detection in collaboration with Geometrics Inc.
- Development of a 32-channel magnetoencephalography (MEG) imaging system
- Chip-sale atomic magnetometers for space in collaboration with Applied Physics Lab/John's Hopkins University
- Scientific consulting for National Semiconductor/Texas Instruments on cell fabrication for chip-scale atomic magnetometers

2004 - 2007 — Chip-Scale Atomic Clocks

- Microfabricated vapor cells for chip-scale atomic sensors: develop methods to create high vacuum in small microfabricated structures
- Advanced interrogation schemes for chip-scale atomic clocks based on coherent population trapping
- Low-power microwave oscillator and miniature control electronics for chip-scale atomic clocks
- Developed improved microfabricated vapor cell technology amenable to wafer-level fabrication
- Anti-relaxation wallcoatings in alkali vapor cells
- Self-assembled monolayers as surface coatings for alkali cells in collaboration with CU Boulder and Princeton University
- Diode laser technology and noise characteristics
- Electronic and optical feedback systems
- Scientific consulting for Honeywell Inc.

2004 – present — Other Chip-Scale Atomic Devices

- Parallel wafer-level cell fabrication for chip-scale atomic devices
- Demonstrated first microfabricated laser frequency stabilization
- Microfabricated vapor cells for small lightweight laser frequency stabilization in collaboration with AOSense Inc.
- Miniature Dichroic Atomic Vapor Laser Lock in collaboration with the University of California at Berkeley
- Advanced vapor cells for NMR gyroscopes in collaboration with UC Davis
- Miniature atomic optical isolator in collaboration with University of Durham, UK
- Micrometer-size atomic vapor cells for low-power atomic sensors

NIST Affiliations through

Employee	2012 – 2016
University of Colorado at Boulder, CO USA	2009 – 2012
Protiro Inc., Denver, CO USA	2005 – 2009
University of Colorado at Boulder, CO USA	2005
Rheinische Friedrich Wilhelms Universität, Bonn, Germany	2004 – 2005

SELF-EMPLOYED SCIENTIFIC CONSULTANT — 2010 - 2011

BOULDER, CO USA

Twinleaf LLC: Low-Cost chip-scale atomic magnetometer design and cell fabrication (part-time)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) — 2001 - 2003
BOULDER, CO USA
Postdoctoral Guest Researcher

- Developed the first chip-scale atomic clock physics package
- Developed the first microfabricated alkali vapor cells
- Determined sensitivity limits for coherent population trapping in small vapor cells

RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT— 2001
BONN, GERMANY
Postdoctoral Guest Researcher

- Locked the repetition rate of a femtosecond laser to a miniature microwave Rb Clock

RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT— 1998 - 2001
BONN, GERMANY
Graduate Research and Teaching Assistant

- Dark Resonance clocks and magnetometers

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) — 1999 - 2000
BOULDER, CO USA
Graduate Student Guest Researcher

- CPT atomic clocks

RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT— 1997 - 1998
BONN, GERMANY
Diploma Research Assistant

- Single Cs atoms in a magneto-optical trap

PAUL SCHERRER INSTITUTE — 1996
VILLIGEN, SWITZERLAND
Trainee

- Monte Carlo simulations of positron paths in materials with high scattering rates for positron-emission tomography

UNIVERSITY OF NEW SOUTH WALES — 1995
SYDNEY, AUSTRALIA
Undergraduate Research Assistant

- *Honors Project:* Monte Carlo Calculation of Mass Gap
- Quantum Chromodynamics