Exponent®
Engineering & Scientific Consulting

Annalies Kleyheeg, Ph.D.

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Professional Profile

Dr. Kleyheeg is a physicist with expertise in specialized instrumentation for various technology areas including astrophysics, particle physics, and thermal systems. Her experience spans multiple areas including electronics design and fabrication, control software development, thermal management, and mechanical design. She applies her skills and expertise to interdisciplinary projects which tackle unique challenges including failure analysis, risk assessment, remote communications, and hardware development and testing.

Dr. Kleyheeg has experience in dark matter research and experimental particle physics. While completing her bachelor's degree in physics at Boston University, she developed nuclear magnetic resonance (NMR) measurement circuits and fiber optic assemblies for the CASPEr dark matter search. Here she also gained experience with electron paramagnetic resonance (EPR) measurements and modelling quantum spin precession dynamics. Dr. Kleyheeg also worked on the GBAR antimatter experiment at CERN, where she helped program and test the real-time monitoring system for the experiment's positron accumulator.

Dr. Kleyheeg is experienced in both hardware design and software development. Specifically, she is trained in the use of various machining tools such as drill presses, lathes, end mills, and hand-held power tools. She also has experience in developing and reviewing machine drawings, including the use of CAD tools such as SolidWorks and similar design software. Similarly, Dr. Kleyheeg is experienced in electronic cable and PCB design, fabrication, and testing, as well as developing and reviewing circuit schematics through the use of ExpressPCB and LTSpice. She is also fluent in a wide array of programming languages such as: Python, C, MATLAB, and LabView.

Prior to joining Exponent, Dr. Kleyheeg completed her PhD at Brown University, where she conducted research as a member of NASA's EXCITE mission. Her work involved designing, integrating, and testing the control electronics and software for EXCITE's cryogenic subsystem with the goal of ensuring the thermal requirements of the cryogenic receiver were met and that exported vibrations from the cryocoolers did not limit the instrument's sub-arcsecond pointing capabilities. She was heavily involved in every stage of development, from building thermometry measurement circuits and troubleshooting serial communication between devices to integrating and operating the complete cryogenic control system in the field during the EXCITE 2024 North American test flight campaign. Dr. Kleyheeg has also participated in multiple science outreach and mentorship organizations, including Project SHORT and Skype a Scientist.

Academic Credentials & Professional Honors

Ph.D., Physics, Brown University, 2025

B.A., Physics, Boston University, 2020