

Alexander Klein

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Education

Johns Hopkins University, Baltimore, MD, USA

Graduated 2022

Master of Science in Mechanical Engineering, *Aerospace Concentration*

GPA: 3.83

Coursework included Space Systems Engineering, Aerospace Structures, Image Processing, Creo CAD Software, Applied Finite Element Analysis, Disaster Risk Mitigation, Politics of Outer Space

Johns Hopkins University, Baltimore, MD, USA

Graduated 2022

Bachelor of Science in Mechanical Engineering, *Space Science Minor*

GPA: 3.71

Additional Coursework in Engineering Management, Electronics and Instrumentation, ArcGIS, Wind Energy

Teaching Assistant for Engineering Design Process, Mechanical Engineering Laboratory and Seminar

Hopkins SAE Baja Racing, *Controls Lead & Testing Lead*

- Created infrastructure to prioritize, plan, execute, and correlate vehicle tests; helped achieve 1st place design finish
- Manufactured vehicle with team (~300 hours milling, ~50 hours lathe experience) and utilized MTS tensile machine

Extracurriculars: Outdoor Pursuits *Climbing Instructor*, AEPi *Treasurer*, Lab Machine Shop *Manager*, Model UN *Chair*

Professional Experience

BAE Systems – Space and Mission Systems (*Formerly Ball Aerospace*)

Boulder, CO, USA

Materials and Process Engineer II

2023 – Present

Optomechanical R&D – *NASA Habitable Worlds (HWO) and ESA LISA Telescope development*

- Principal Investigator for UltraStable Telescope: led development of all-glass structure aligned to micron-level accuracy using picomotors, bonded with UV-cure adhesive, and subjected to environmental testing
- ULTRA Project: assembled picometer-stable telescope cell with active sensing and control; optomechanical design of 3-segment, 6DOF prototype for NASA ROSES D.19; attendance at SPIE Mirror Tech Days Conference
- UltraThin Bonds Study: development of single-digit micron bond lines for low-CTE optical applications

Process Development – *improving hardware performance and increasing company capabilities*

- Lubricated Washers Initiative: secured funding from senior management to increase bolt preload across entire organization by ~3x; conducted process testing for staking, grounding, and contamination concerns
- Sputter coating capacitors on glass substrate: trade study of methods and suppliers; masking process testing
- Built vacuum chamber with thermal controls to measure outgassing per ASTM E595; tested and correlated results

Program Engineering – *mechanisms consulting and processing for several Space Force programs*

- Anomaly investigations: flaking nickel plating, poor paint adhesion, magnet particle generation, flexure polishing
- Procurement support for shutter door motor components, including multiple trips to supplier for MIPs and reviews
- Inspection of flight bearings upon arrival using custom built GSE; cleaning of several large gimbal assemblies

Facilities Engineering & Manufacturing Intern

2020 & 2021

- Managed various projects as facility engineer; specialized in SCIF construction; created Building Information Model
- Evaluated chilled water, compressed air, and liquid nitrogen systems in 380k s/f complex; contracted report
- Planned shop orders and oversaw completion of hardware fabrication and assembly; monitored and issued inventory

FreshAir Sensor LLC

Lebanon, NH, USA

Product Development Team Intern

2019

- Conducted tests on BLE, Ultrasound, and RFID for indoor positioning feasibility study (used MATLAB & Arduino)
- Decreased product manufacturing time by designing and assembling a tool to batch measure sensor resistances

Research Experience

Space Telescope Science Institute (STScI)

Baltimore, MD, USA

Lead Designer & Systems Engineer

2021 – 2022

- Developed ASSIST: an active segmented hexagonal telescope for Habitable Worlds coronagraph research on HiCAT
- Iterated 6DOF and 3DOF segment designs, utilizing mechanical coarse actuation and piezo fine actuation stages
- Fabricated system level prototypes to measure wavefront error and gain confidence in optical bonding method
- Submitted and awarded ~\$2M NASA ROSES D.3 APRA for future work, granted “Excellent” rating from reviewers
- Contracted by STScI while at BAE for continued mechanical design consulting and development strategy

University of Minnesota Genomics Center

Remote

Mechanical Engineer

2020 – 2021

- Worked on team to develop a custom robotic uncapping machine for COVID-19 testing automation (96 vials / minute)
- Designed novel 12-gear worm mechanism for synchronous uncapping rotation, fabricated with 3D printed components
- Created adjustable pipette matrix for automatic sample spacing conversion between racks in two dimensions

Conference Proceedings

"Achieved maturation of key component-level technologies to enable large, segmented apertures in an ultra-stable optical architecture", Proc. SPIE 13092, Space Telescopes and Instrumentation 2024: Optical, Infrared, and Millimeter Wave, 130921K (23 August 2024); <https://doi.org/10.1117/12.3014539>

"Broadband performance of the PAPLC coronagraph on the HiCAT testbed", Proc. SPIE 12680, Techniques and Instrumentation for Detection of Exoplanets XI, 126801D (6 October 2023); <https://doi.org/10.1117/12.2677757>

"High-contrast imager for complex aperture telescopes (HiCAT): 8. Dark zone demonstration with simultaneous closed-loop low-order wavefront sensing and control", Proc. SPIE 12180, Space Telescopes and Instrumentation 2022: Optical, Infrared, and Millimeter Wave, 1218026 (27 August 2022); <https://doi.org/10.1117/12.2630444>

Additional Projects & Papers

Beam Stress and Displacement Analysis of any shape given moments and point forces, developed in MATLAB

Flying Ring Optimization utilizing MATLAB model and experimental data, sponsored by JHU Student Initiatives Fund

Trump Twitter Discourse statistical analysis towards Clinton during the 2016 election, for *Linguistics* course

Statistical Analysis of Ticket Prices of New England ski areas, utilizing a hedonic model to determine key variables

Wind Energy Integration and Storage with the Rail Tie Wind Project in WY as a case study for the *Wind Energy* course

Wing Box Structure design, analysis, built, and test of a model aircraft wing for the *Aerospace Structures* course

Other Experience

Fabrication of Precision Optics Lab, learned grinding and polishing skills

Spring 2024

Front Range Community College in Longmont, CO, USA

Alex Klein Photography, alexkleinphoto.com

Boston, MA, USA

Founder & Photographer

2012 – 2020

- Freelancer for 12 clients/businesses; photographed 30+ events; published in 6 newspapers and 4 magazines
- Assisted professional photographer on magazine and corporate shoots, photographed Governor and Olympic skier
- LiveDry Apparel *Director of Marketing*: developed successful t-shirt Kickstarter crowdfunding campaign

Noteable Personal Achievements: traveled to all 50 US states and 35+ countries, summited 17 of 54 mountains higher than 14,000ft in Colorado, passionate backcountry skier, walked across Taiwan