HALT/HASS TESTING OF ATLAS PIXEL DETECTOR MODULES

REU 2017 - JESSIE JOHNSON

ADVISOR: DR. STUPAK

ATLAS DETECTOR \rightarrow PIXEL DETECTOR

- One of two main detectors part of the Large Hadron Collider (LHC)
- Purpose to detect different particles formed after a collision occurs
- Uses Pixel Detector at its inner most level
- Pixel detector composed of layers of modules about 2000 modules total
- About to be upgraded



MOTIVATIONS FOR TESTING

- Need to test new modules for failures, defects
- Normally runs at -20°C and while not running brought up to room temperature about 20°C
- Temperature fluctuation causes thermal stress on the different layers



HALT/ HASS

• HALT – Highly Accelerated Life Test

• HASS – Highly Accelerated Stress Screening



TESTING

- HALT includes placing modules on a vibration table in an environmental chamber
- Thermal stress causes expanding contracting of materials to create microcracks in materials
- Apply vibrations to target the cracks
- HASS requires thermal and vibrations stresses, but not as extreme
- Need a design that will meet testing parameters and be cost effective to make



MY WORK

- Design a cooling platform
- Chilled Water and a peltier acting as a cooler
- Liquid nitrogen and a peltier acting as a heater



 Need to determine which is going to be the most cost effective, simple and still achieve the cooling capabilities we need



