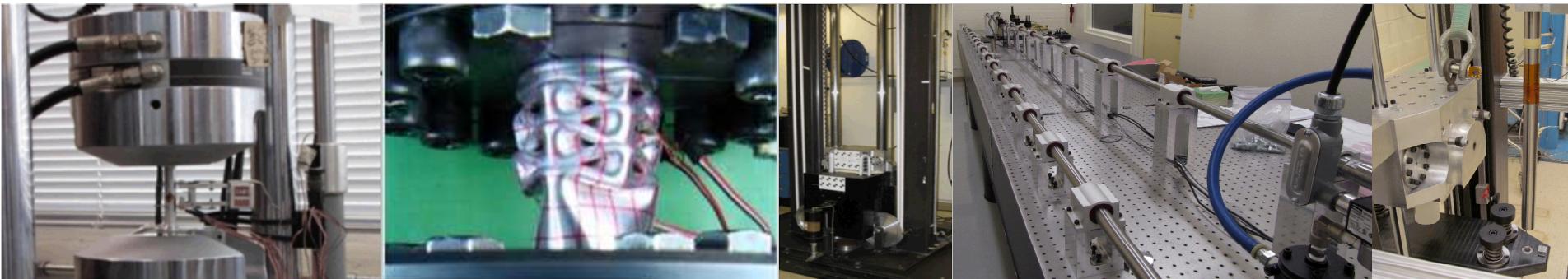


*Exceptional service in the national interest*



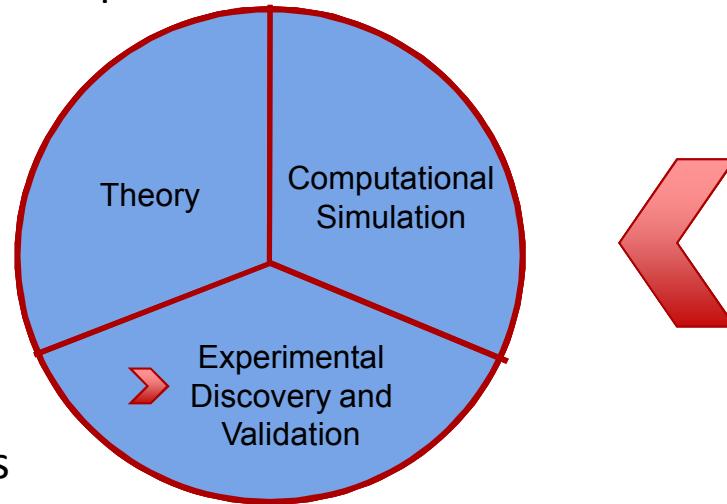
# B860/ETEC Mechanical Shock/Impact Capabilities and Beyond

**Bo Song, Charlotte Kramer, Matthew Spletzer,  
Derrick Jones, Dennis Croessmann**

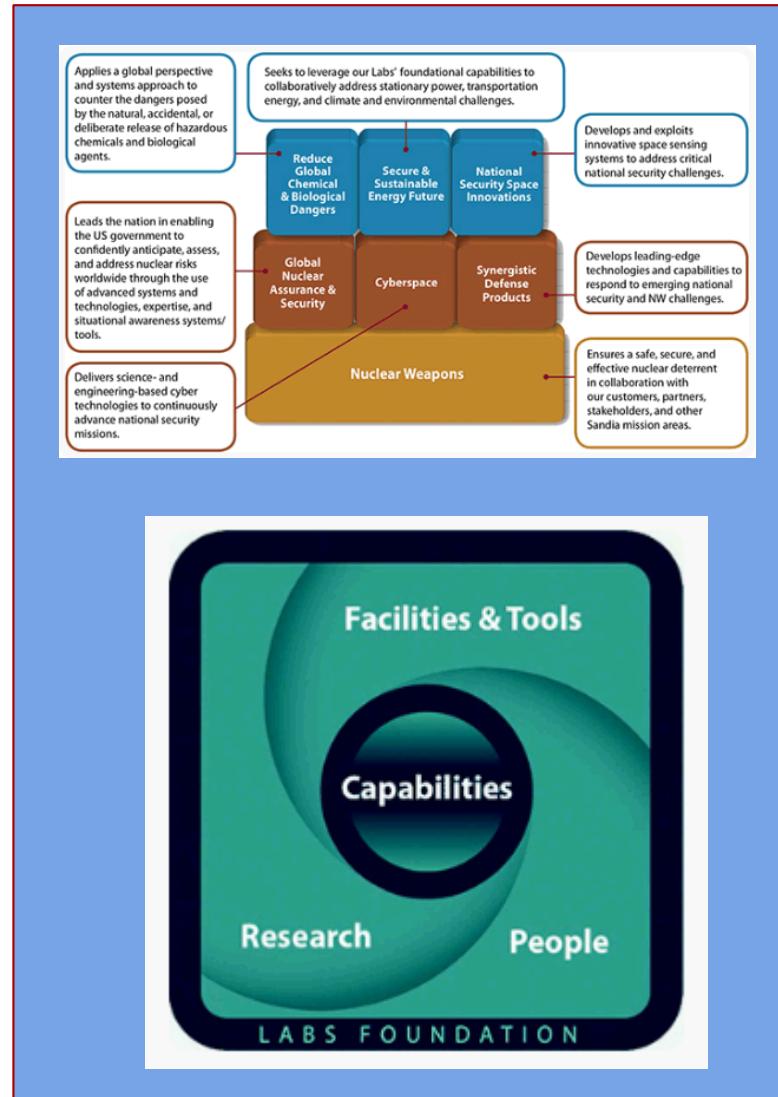
# Engineering Sciences Center (1500)

## ■ Center 1500: Engineering Sciences Center

- Navigating a Path to the Future
- Transforming Engineering Sciences through advancing, integrating and applying our technical capabilities to serve the nation



- Groups
  - Thermal, Fluid & Aero Sciences (1510)
  - Structural Dynamics (1520)
  - Validation and Qualification (1530)
  - Computational Simulation (1540)
  - Solid Mechanics and Shock Physics (1550)



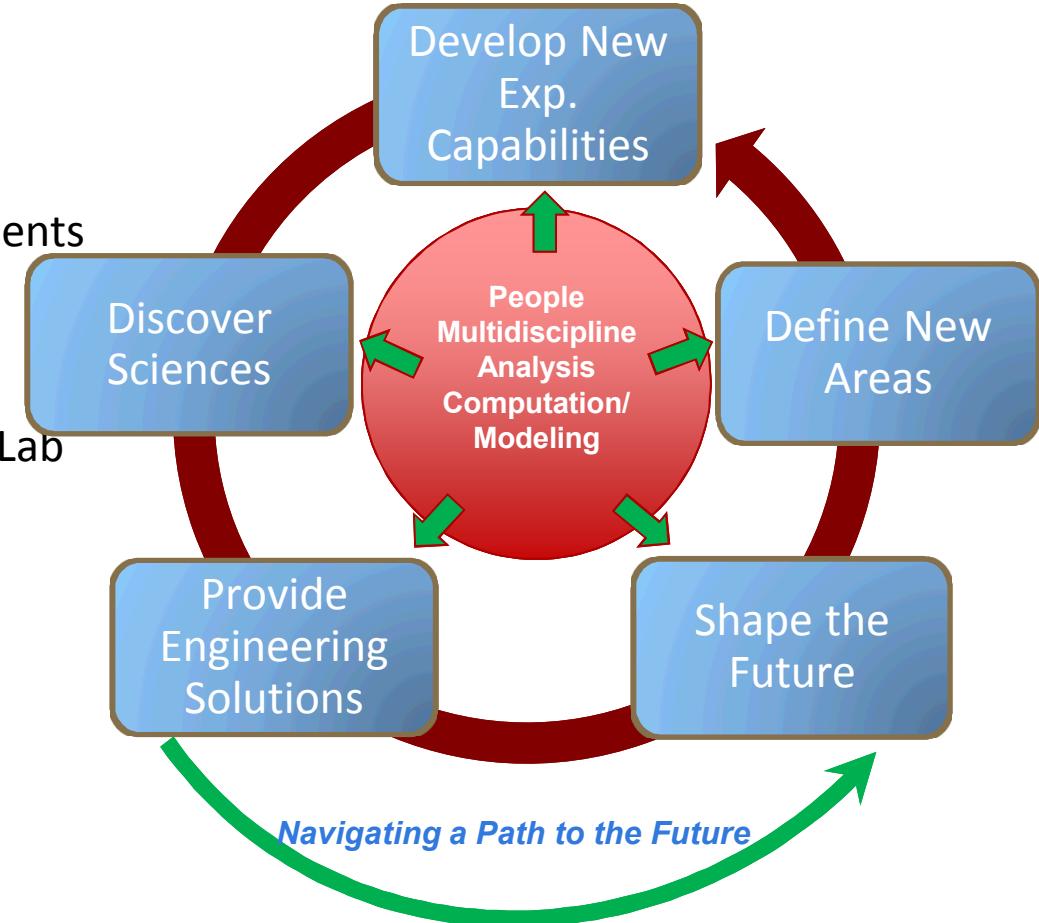
# B860: Environmental Test & Evaluation Complex (ETEC)

- **Research-Development-Application (R-D-A) Spectrum**

- Application-driven R&D
- Analysis guided experiments
- Computation integrated experiments

- **R-D-A Areas**

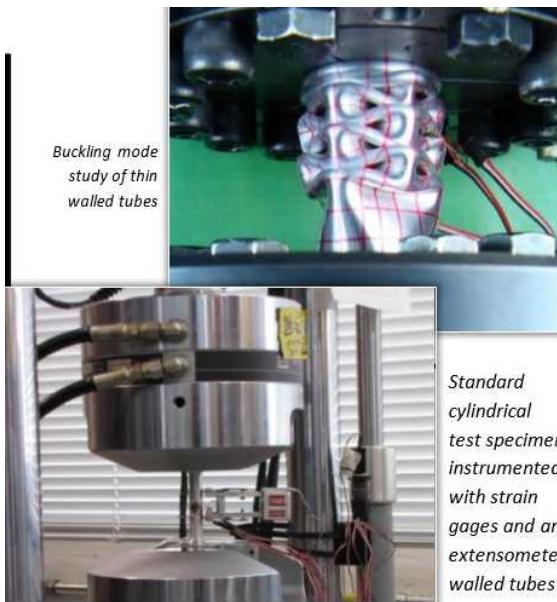
- ▪ Mechanical Shock Lab
- ▪ Experimental Impact Mechanics Lab
- ▪ Structural Mechanics Lab
- Vibration and Acoustic Lab
- Non-destructive Evaluation Lab
- Climatic and Centrifuge Lab
- Component Dynamics Lab
- Radiography Lab
- Structural Dynamics Lab



# Structural Mechanics and Mechanical Shock/Impact Portfolio

## Structural Mechanics Lab.

Servo-hydraulic Testing Machines, Pressure Testing Cage



## Mechanical Shock Lab.

Drop Tables; Slide Table; Resonant Beam/Plate; Package Tester



## Experimental Impact Mechanics Lab

Split Hopkinson Bars, Dropkinson Bar

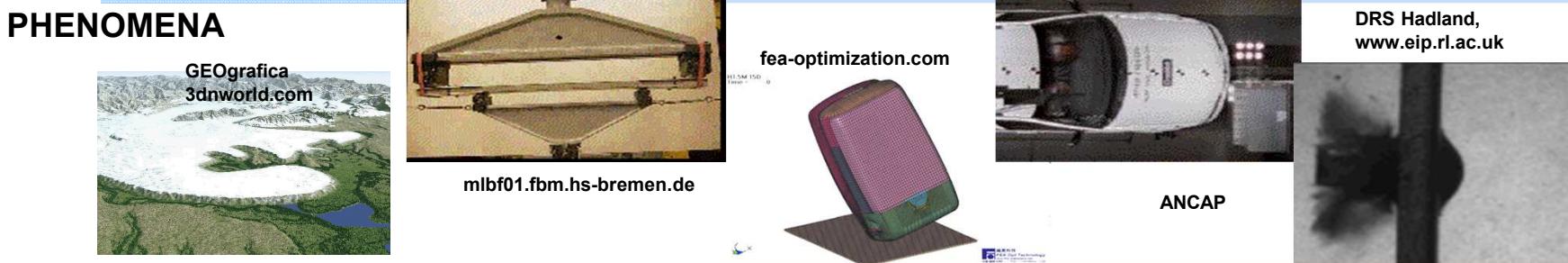
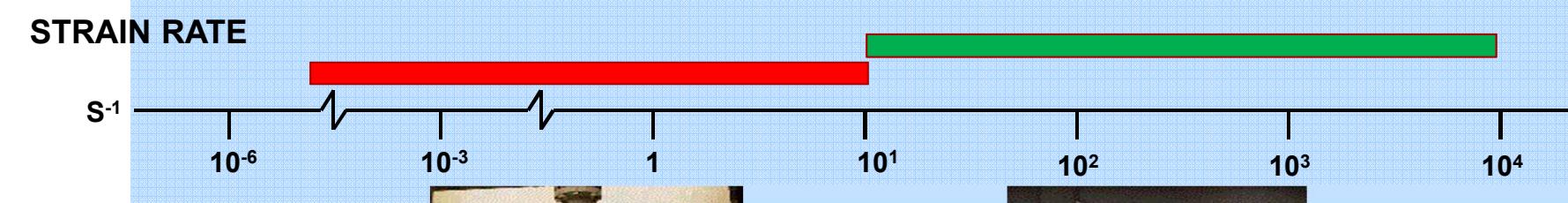
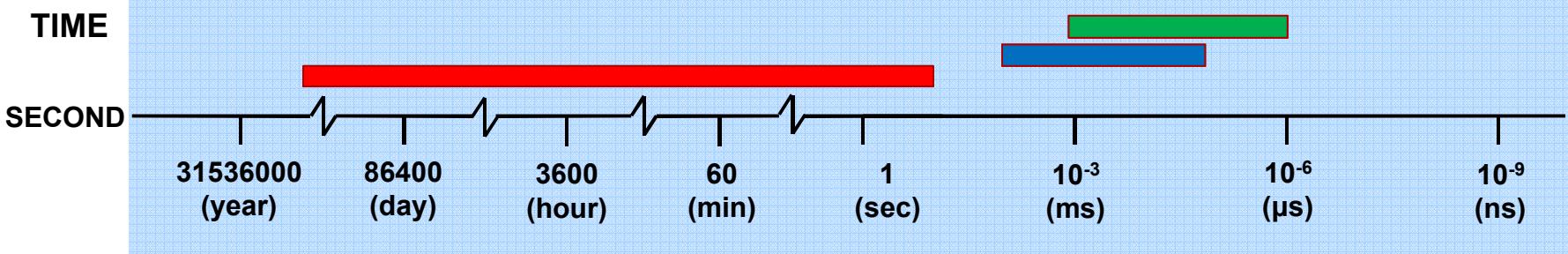


# Structural Mechanics and Mechanical Shock/Impact Capacities

Structural  
Mechanics Lab.

Mechanical Shock  
Lab.

Experimental  
Impact Mechanics  
Lab

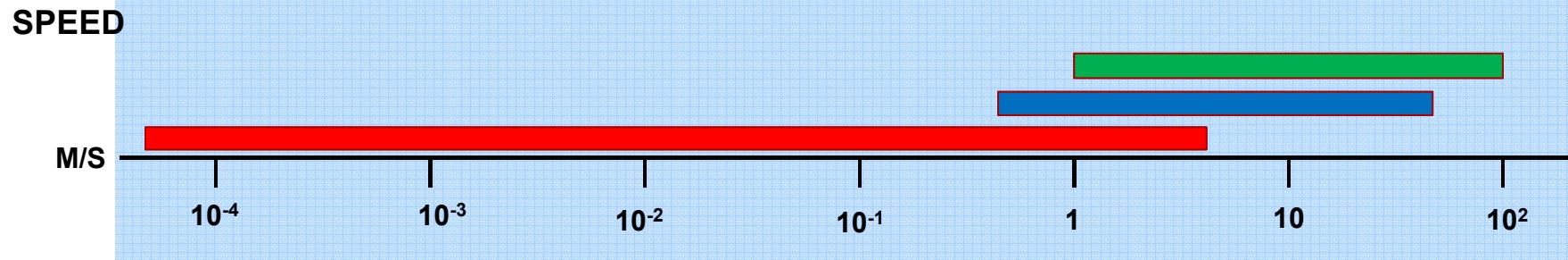
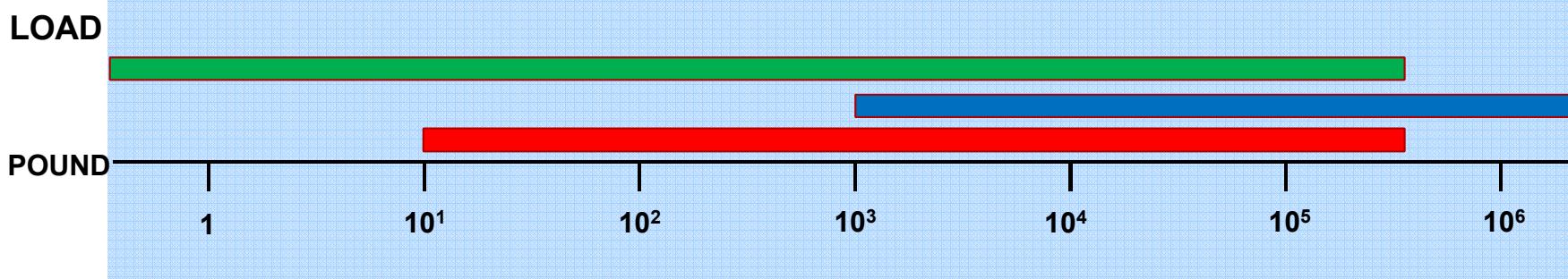


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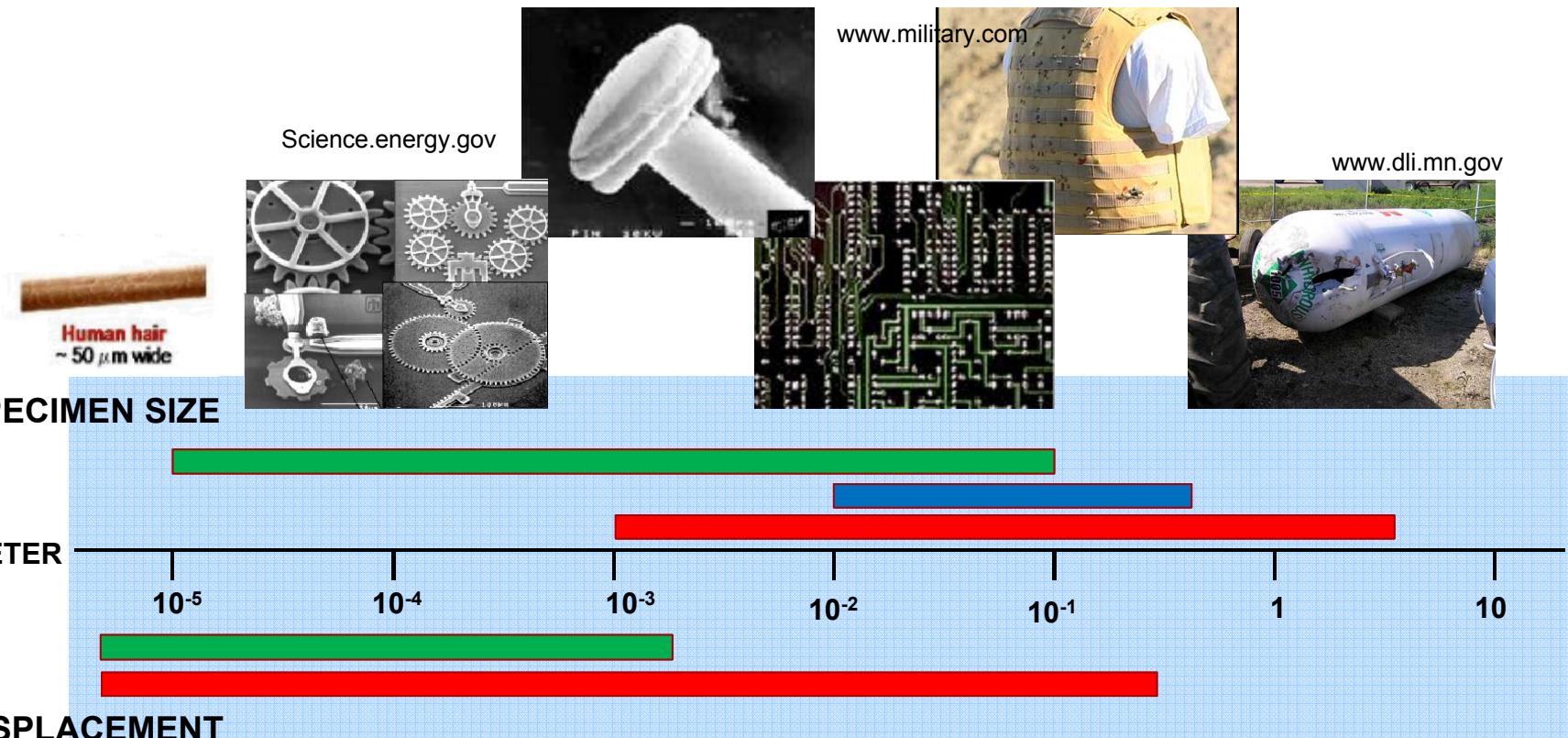


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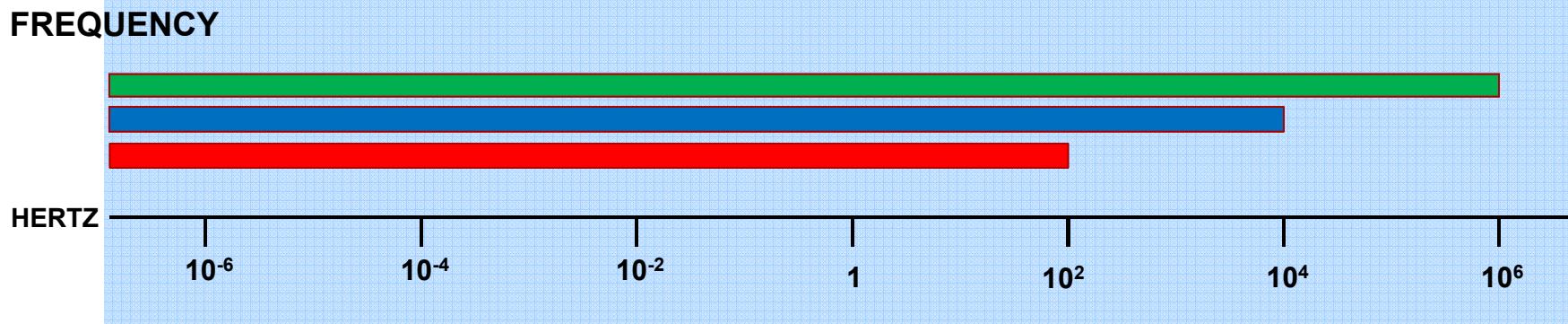
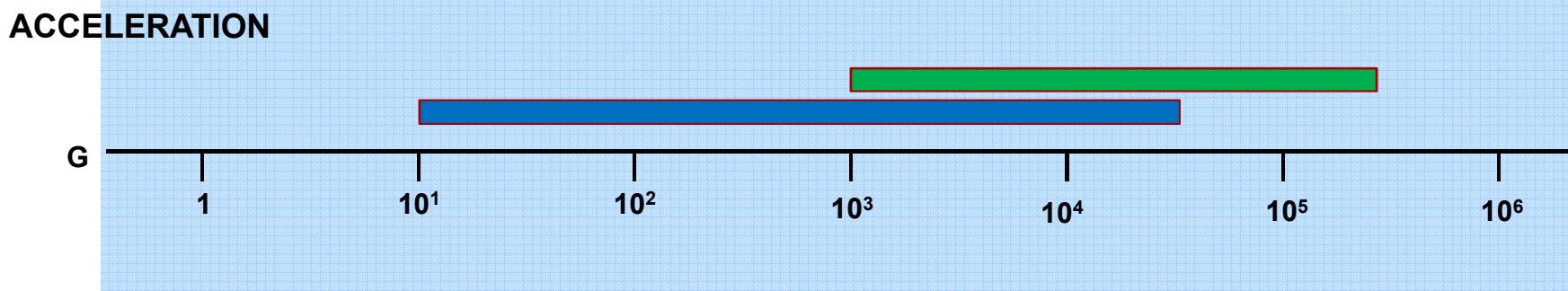


# Structural Mechanics and Mechanical Shock/Impact Capacities

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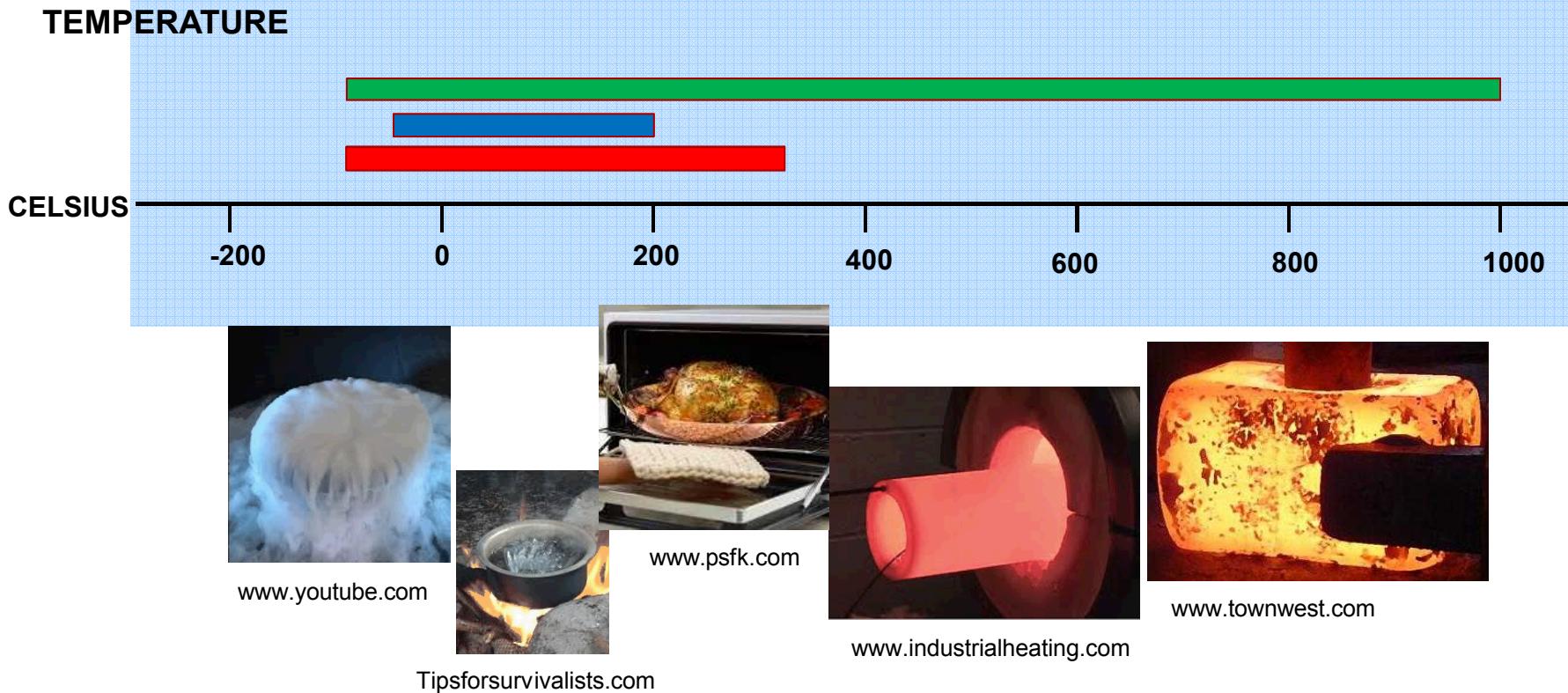


# Structural Mechanics and Mechanical Shock/Impact Capacities

Structural  
Mechanics Lab.

Mechanical Shock  
Lab.

Experimental  
Impact Mechanics  
Lab



# Shock/Impact Mitigation Activities



- Shock/impact mitigation material characterization

- Structural Mechanics Lab:
    - Honeycombs, polymeric foams, springs, etc
  - Experimental Impact Mechanics Lab:
    - Polymeric foams (silicone foam, epoxy foam, polystyrene foam, TDI foam, PMDI foam, Tuf-Foam, syntactic foam, etc)
    - Rubbers (silicone, polyurethane, EPDM, etc)
    - Composites, fabrics, soft metals, etc



- Shock/impact mitigation component characterization

- Mechanical shock Lab/Experimental Impact Mechanics Lab/Structural Mechanical Lab
    - Component survivability/functionality under normal/hostile environments
    - Qualification of shock mitigation response of components
    - Experimental validation of shock/impact models for shock mitigation applications