

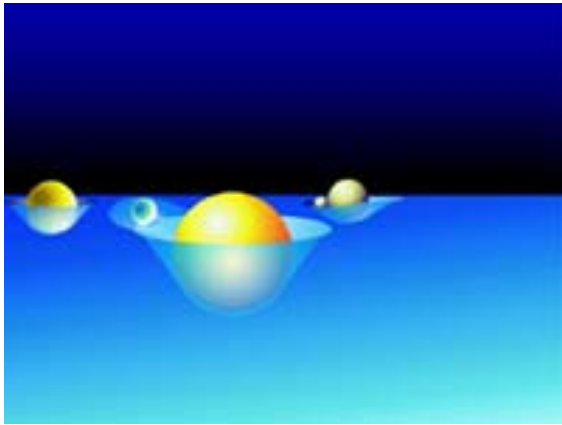
**Rotating Tilt Sensor
for
LISA Torsion Pendulum**

Kathy Chaurasiya

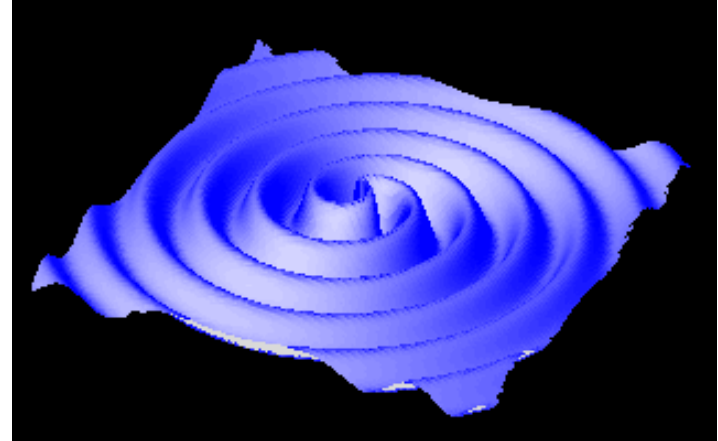
**CENPA
University of Washington
Physics REU 2005**

Gravitational Waves

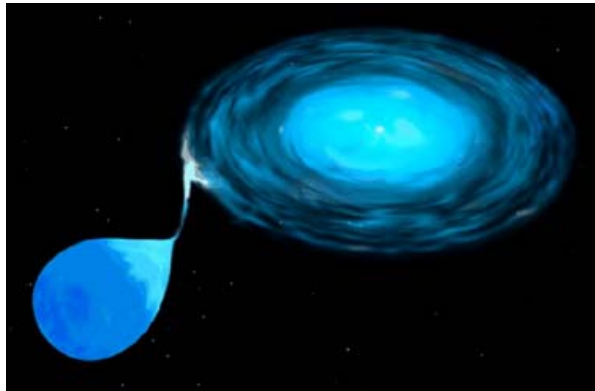
Space-Time Warp



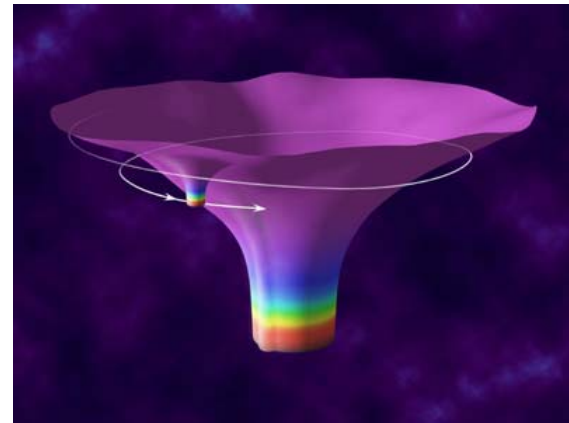
Traveling Distortion



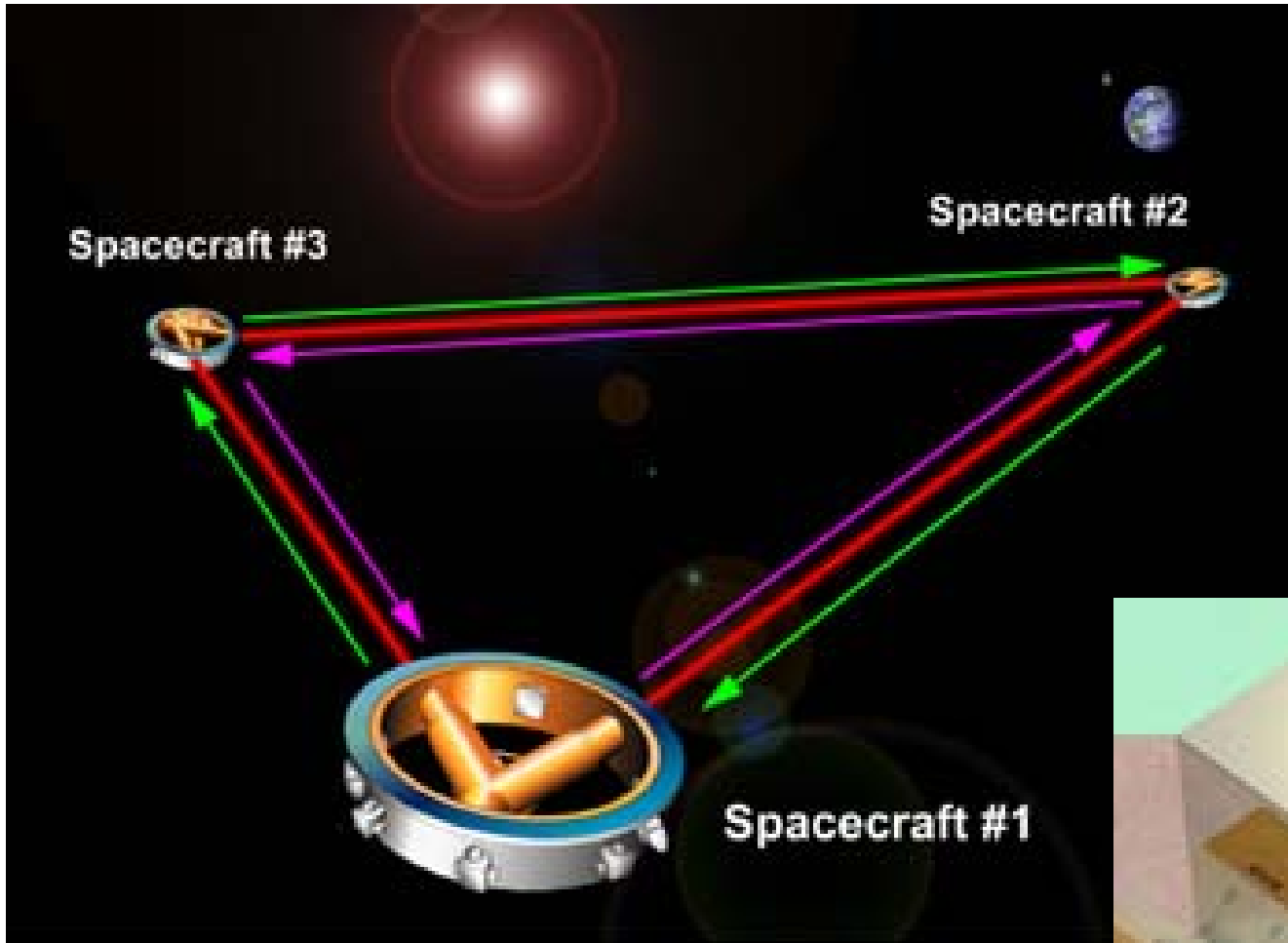
Binary System



Star In Black Hole

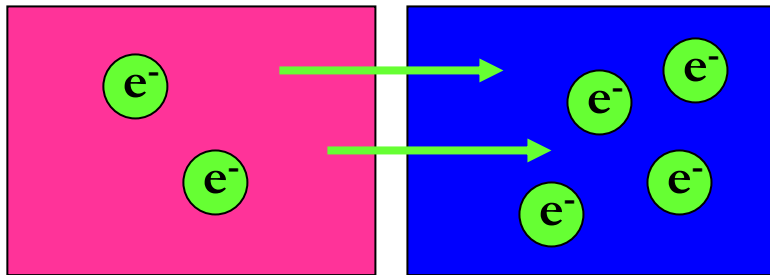


LISA



Small Forces

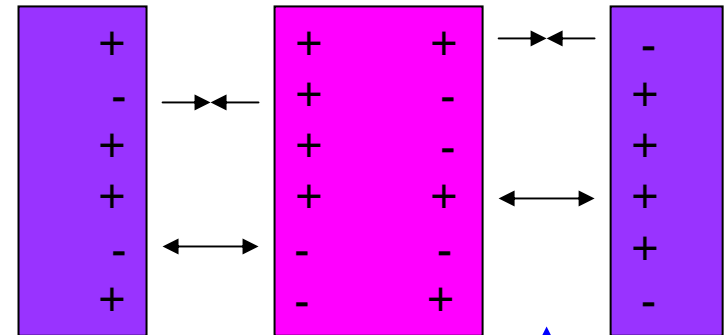
Patch Effect



Metal 1
Small W

Metal 2
Large W

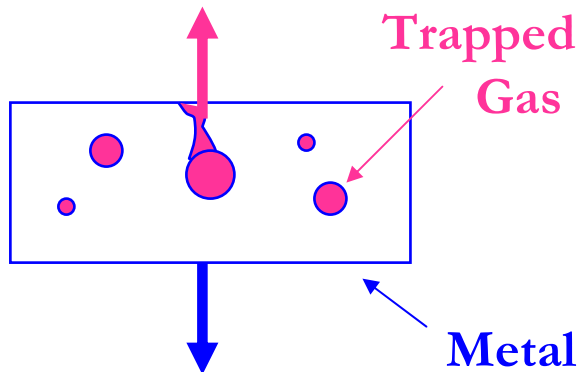
Electrostatic Effects



Test Mass

2-4 mm

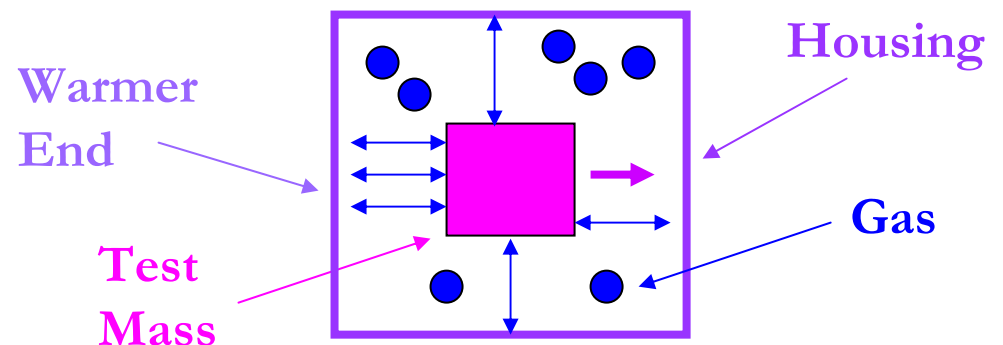
Outgassing



Trapped
Gas

Metal

Radiometer Effect



Warmer
End

Test
Mass

Housing

Gas

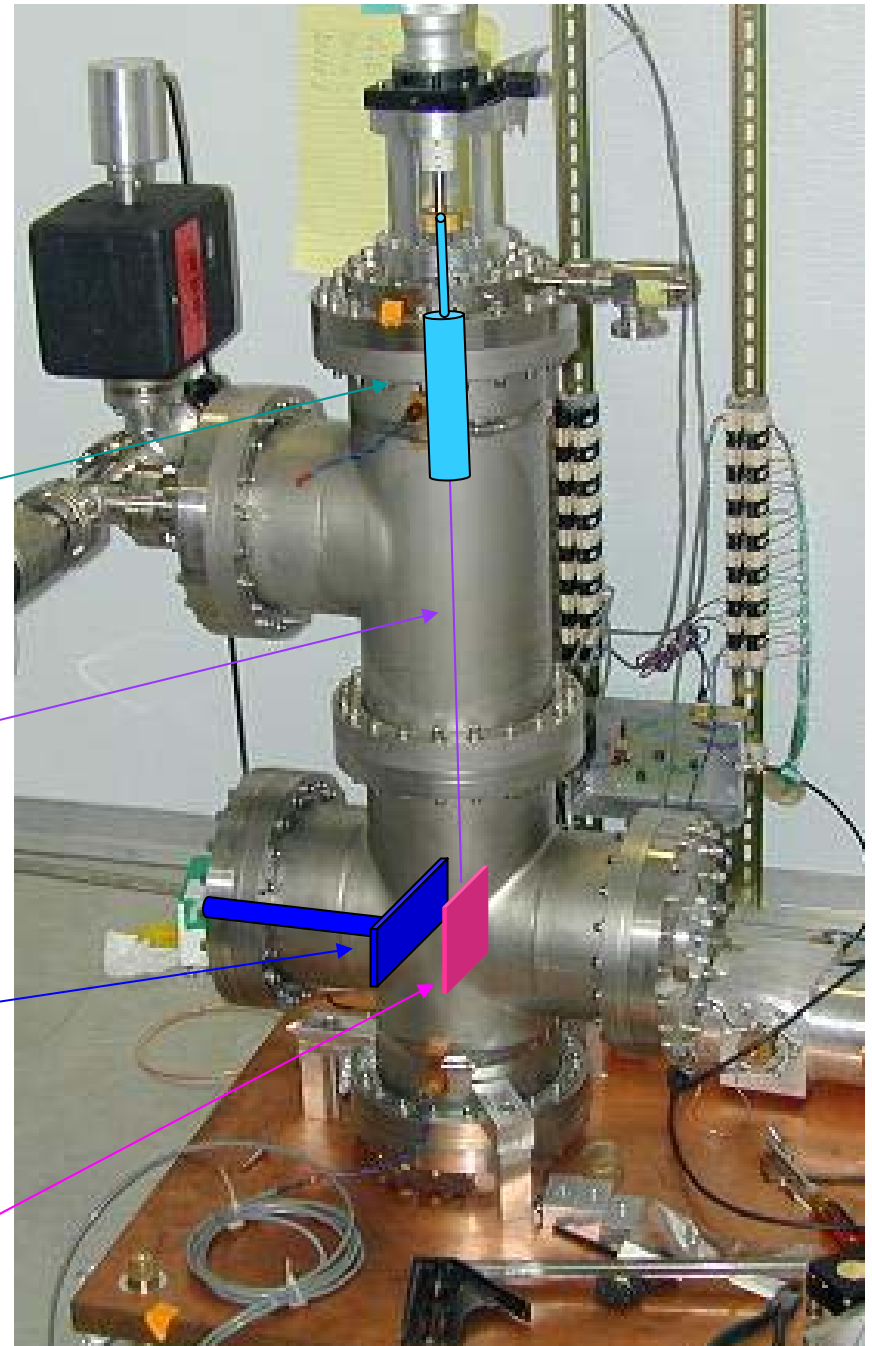
LISA Torsion Pendulum

Swing Damper

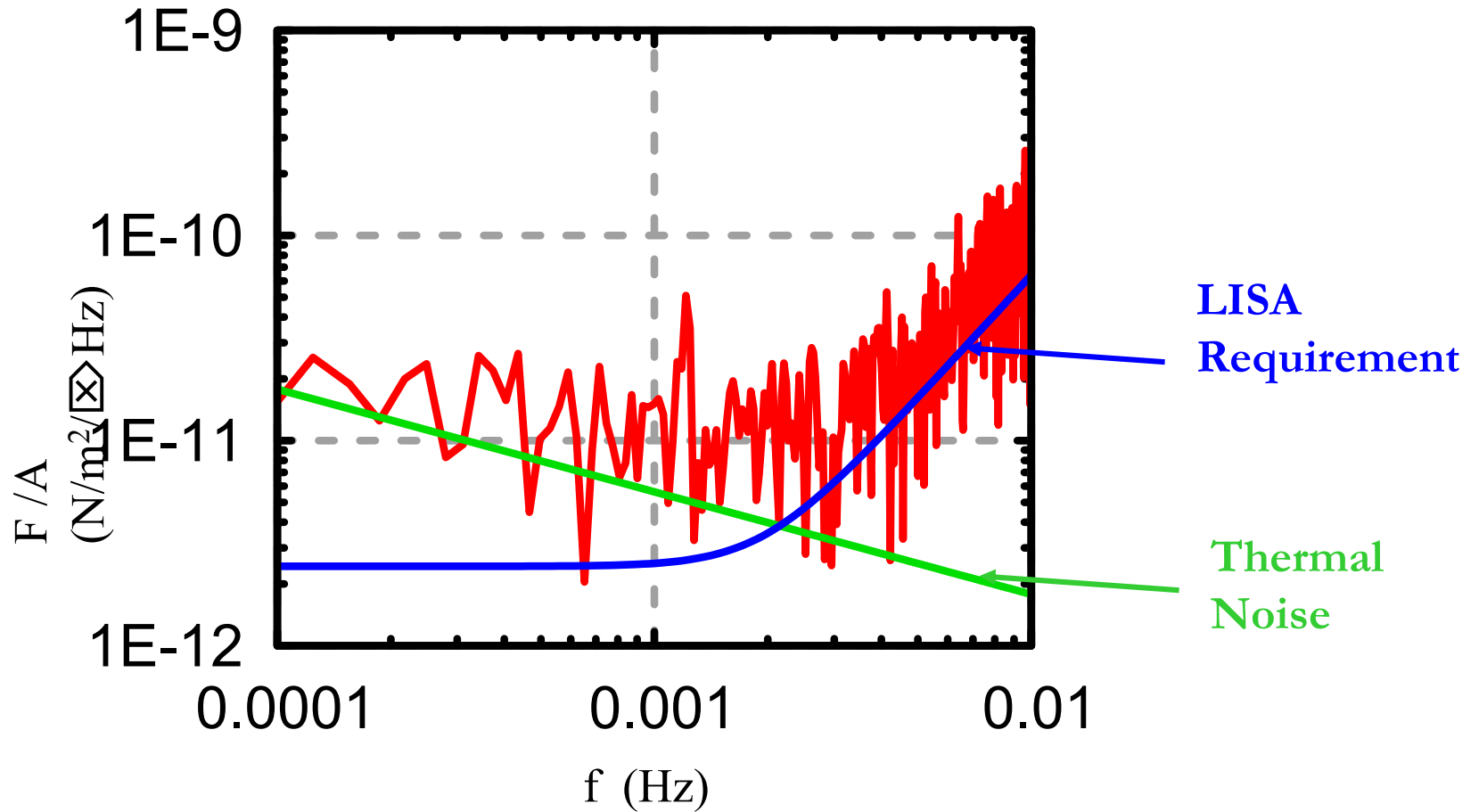
Tungsten Fiber

Adjacent Plate

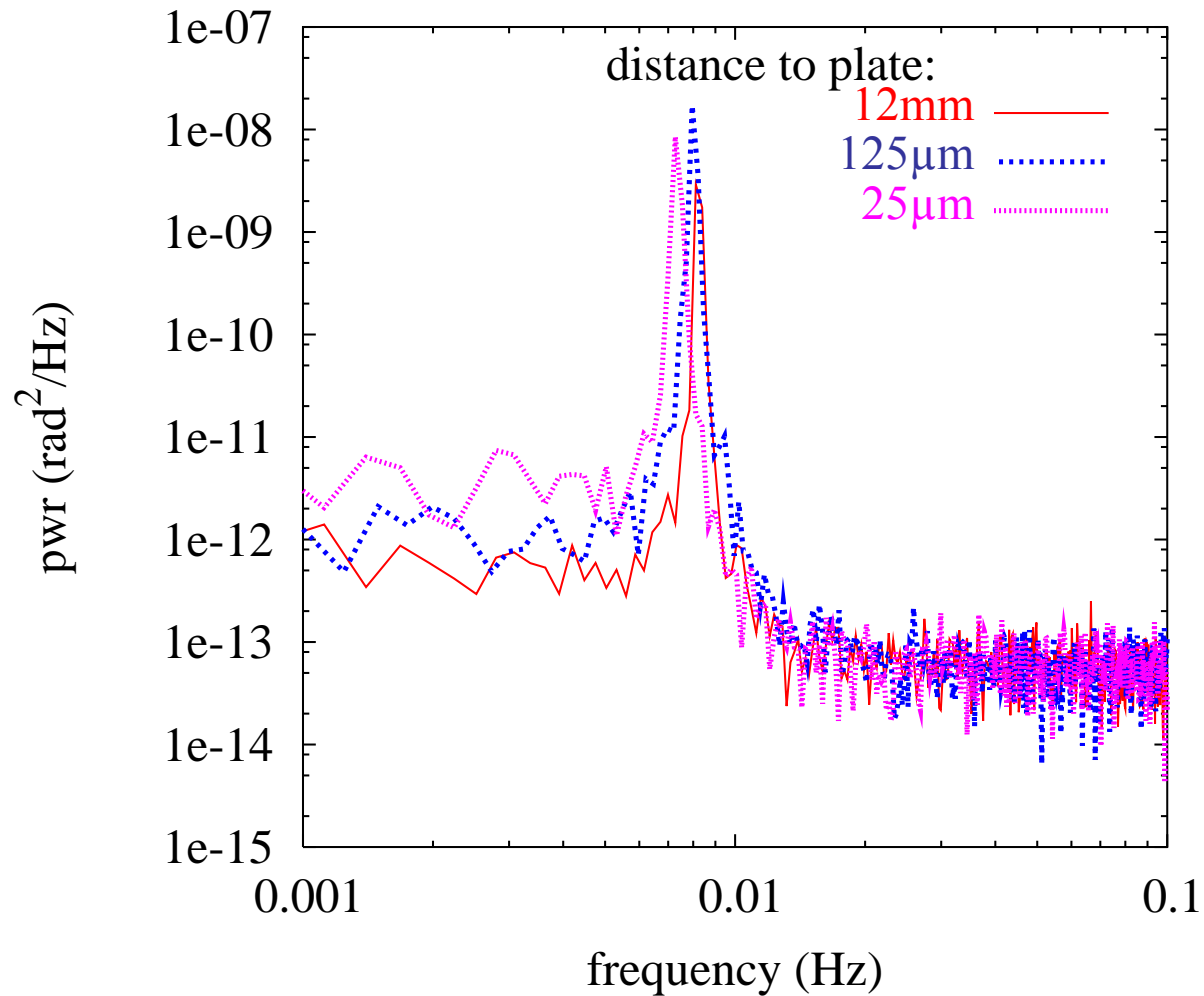
Test Pendulum



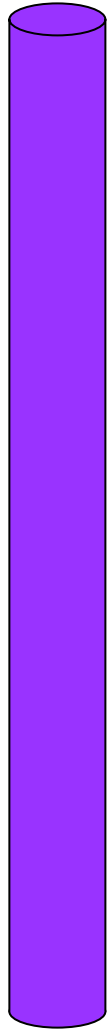
Pendulum Sensitivity



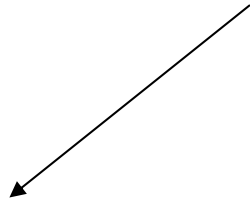
Noise at Various Separations



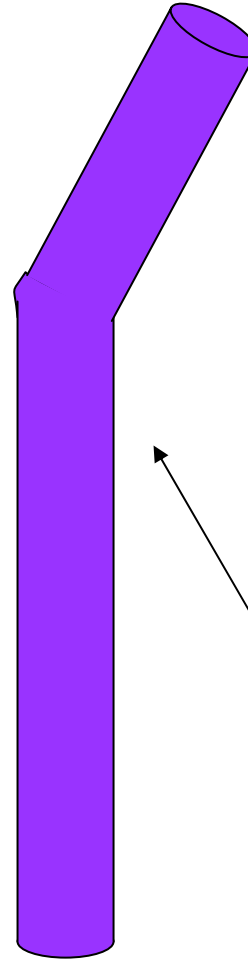
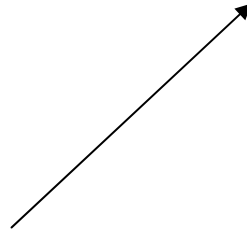
Tilt



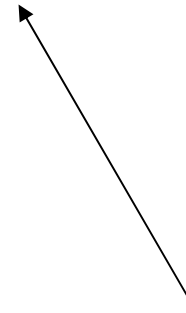
Ribbon Shape of
Tungsten Fiber



This Edge
Swings Inward

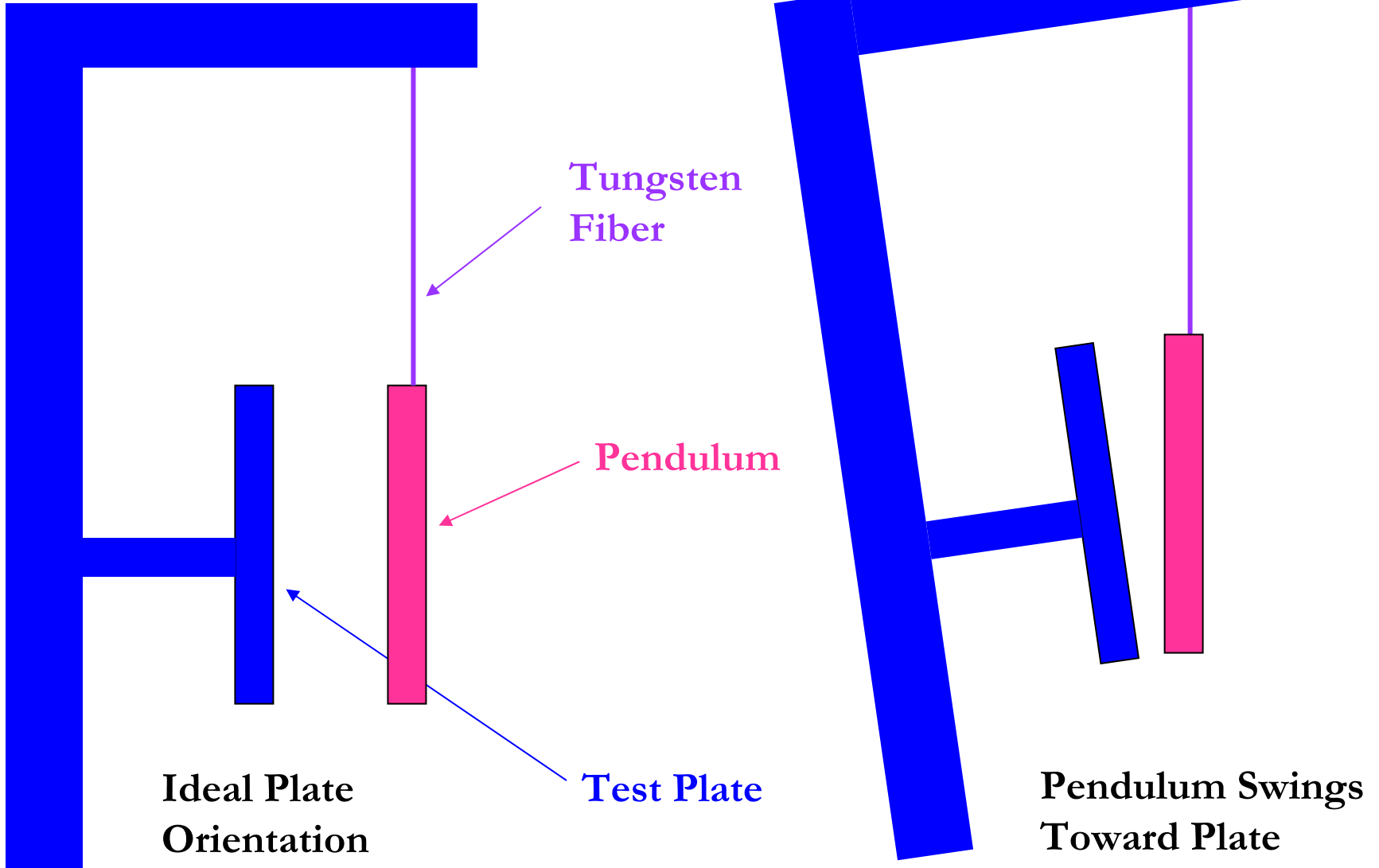


Fiber Tilted
Along Wide Axis

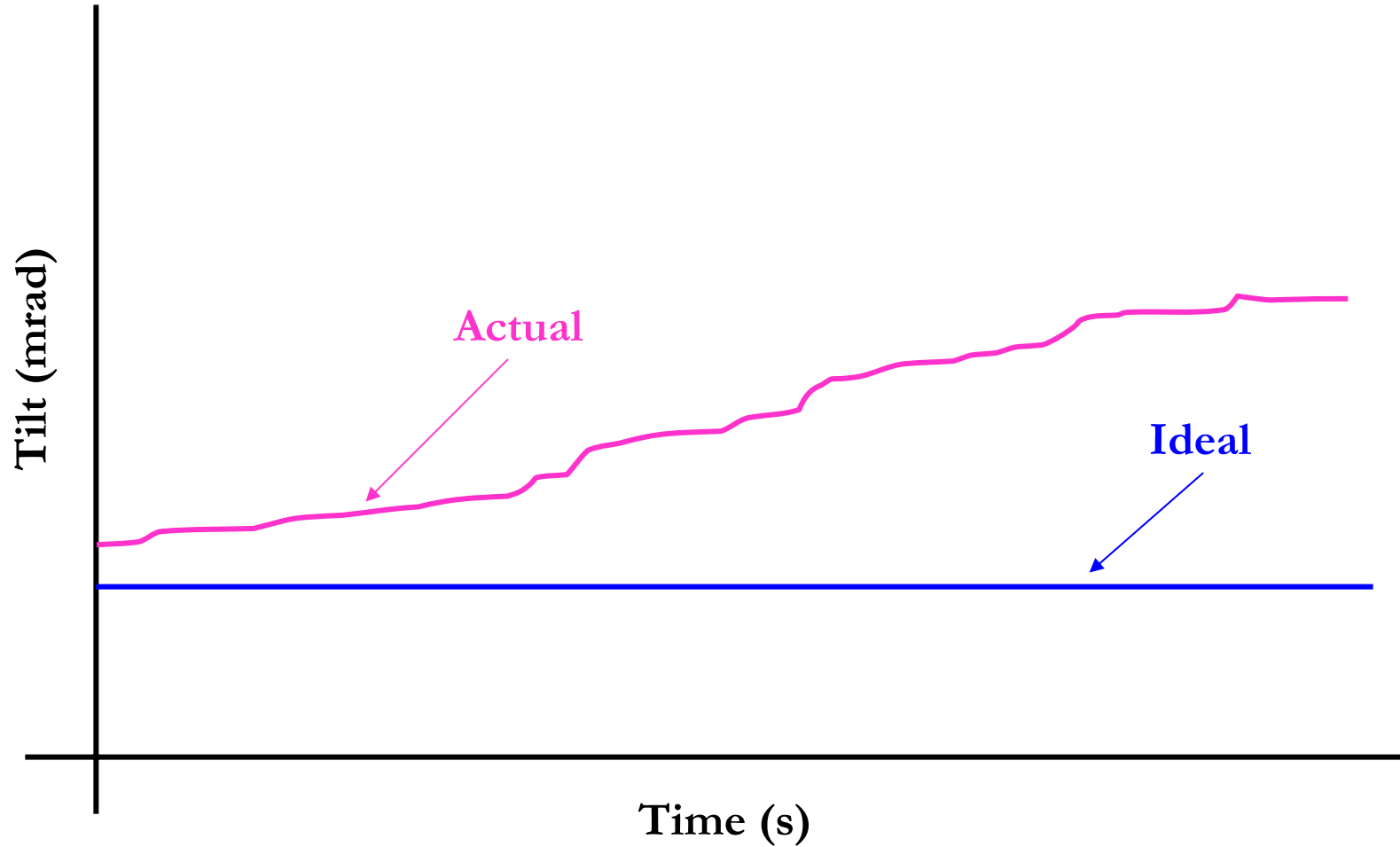


This Edge
Swings Outward

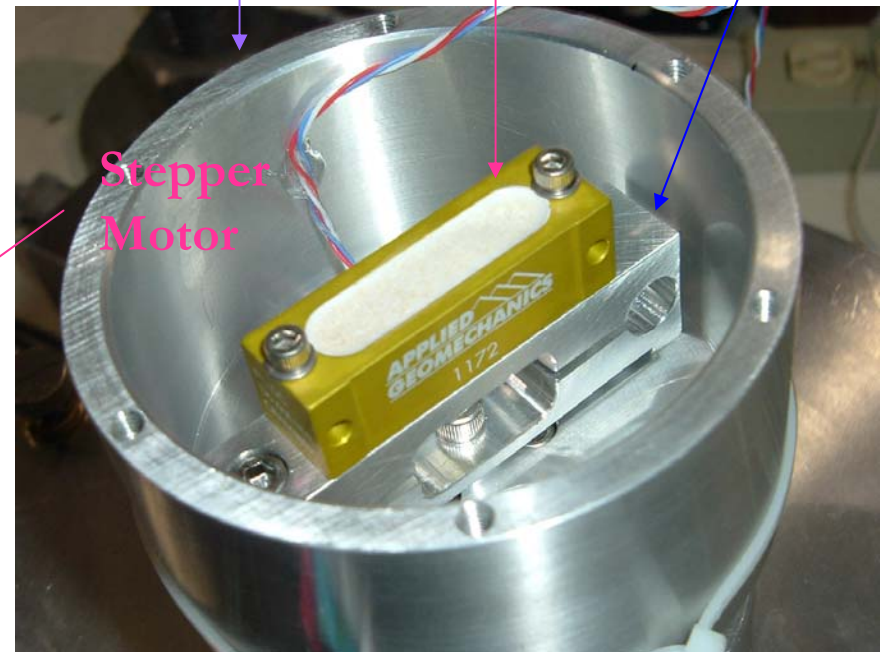
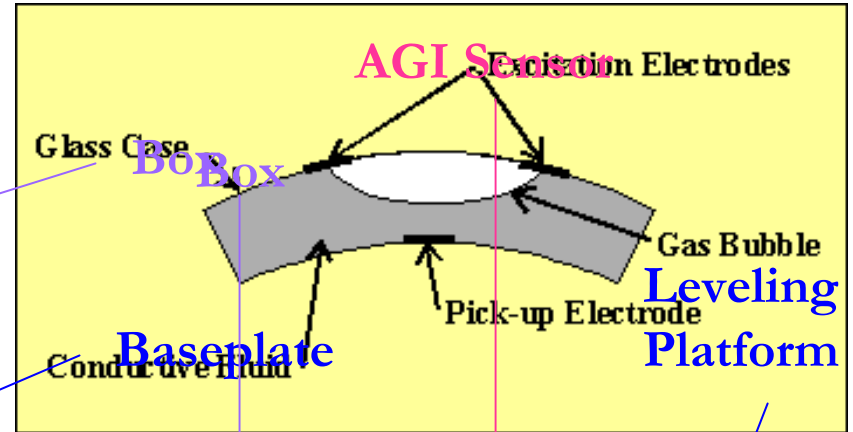
Tilt



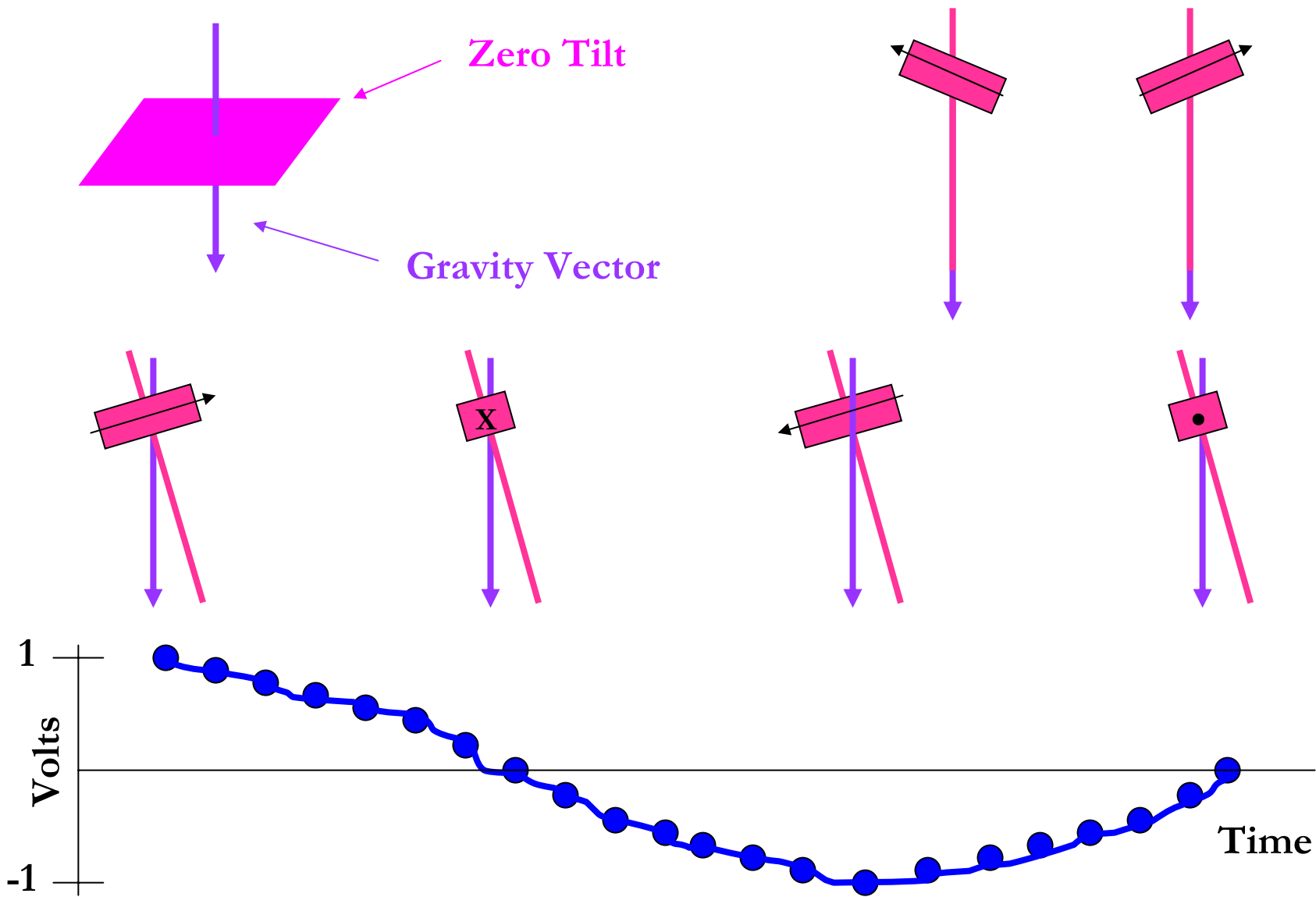
Zero-Point Drift



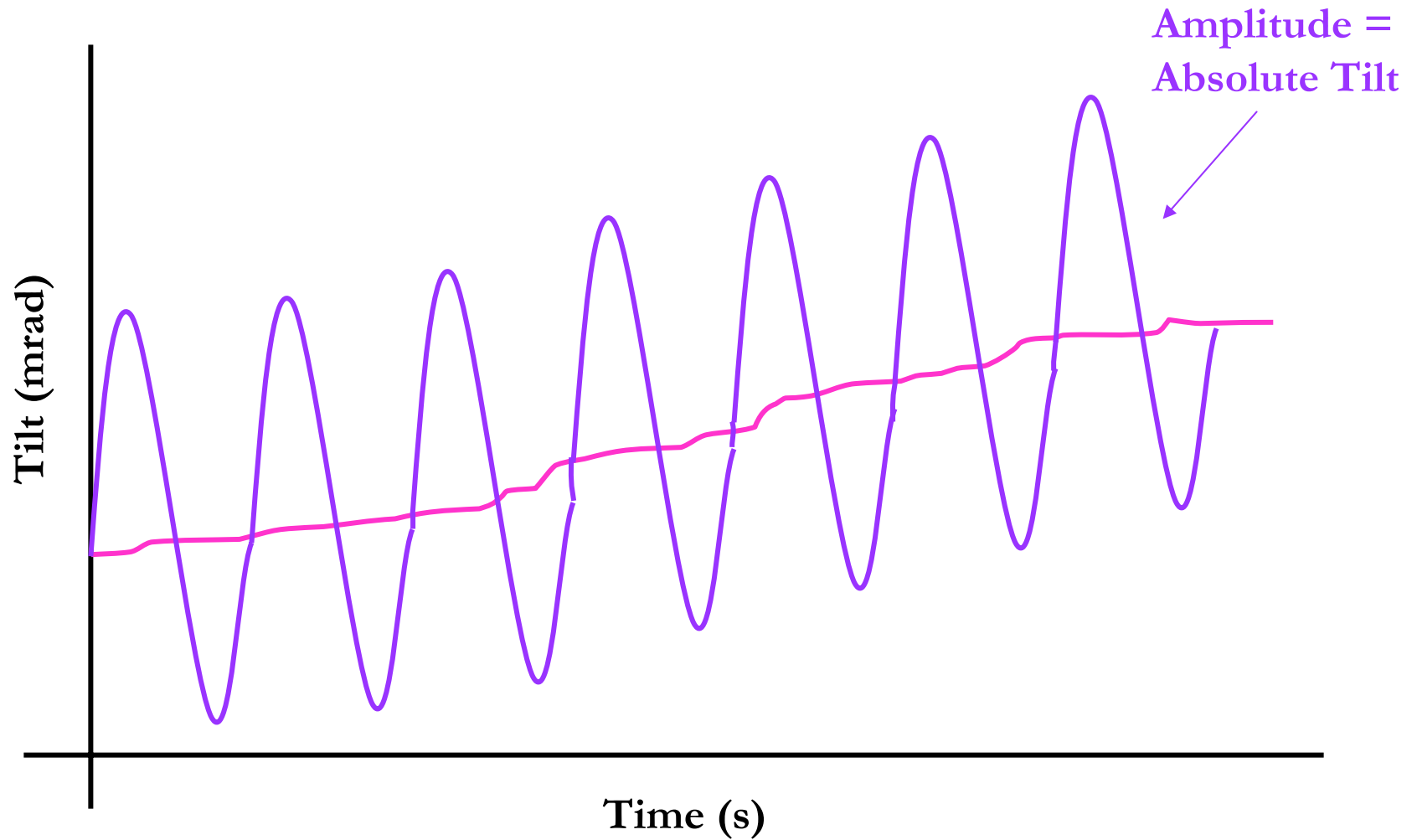
Rotating Tilt Sensor



Sinusoidal Curve

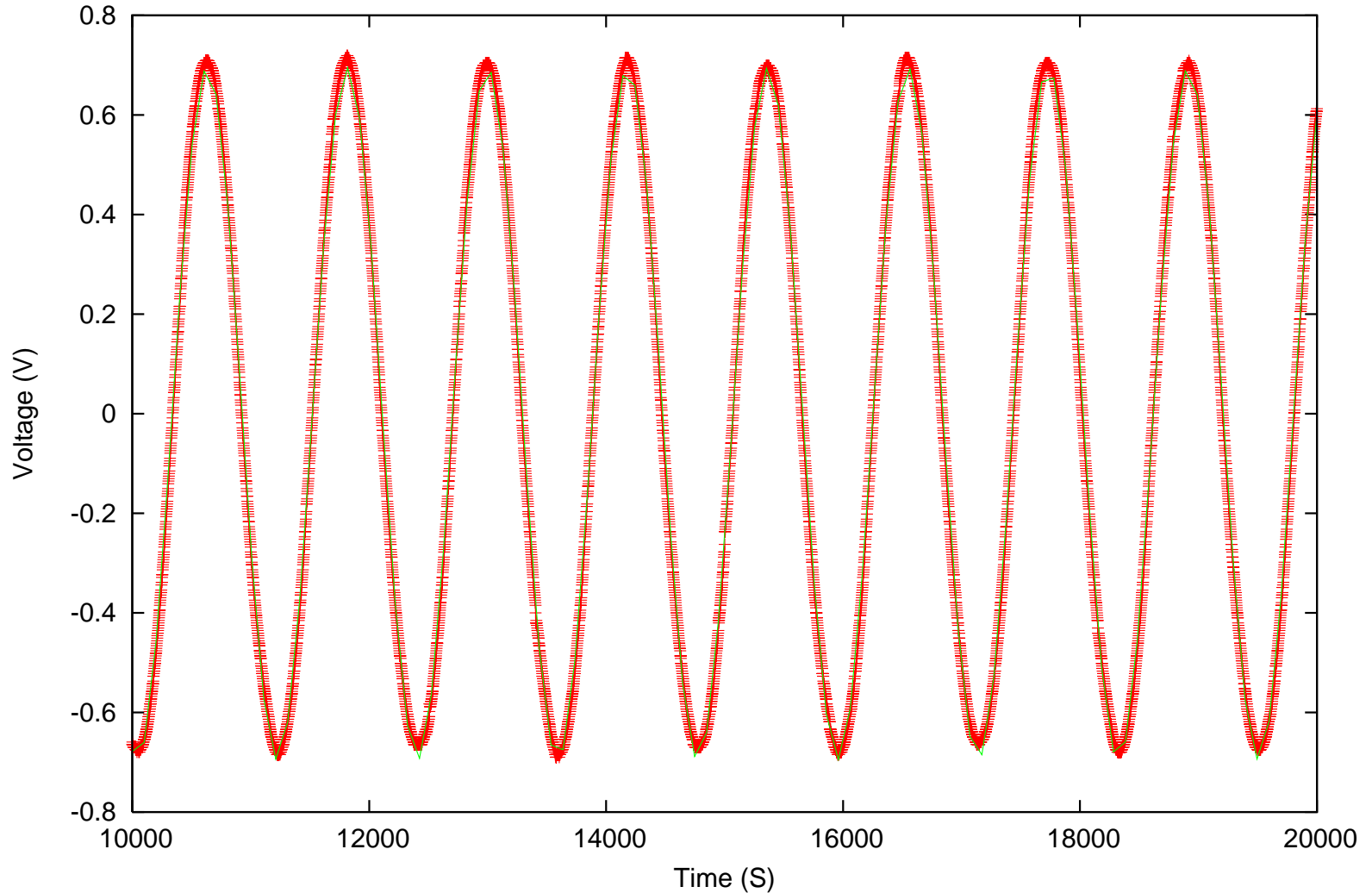


Zero-Point Drift

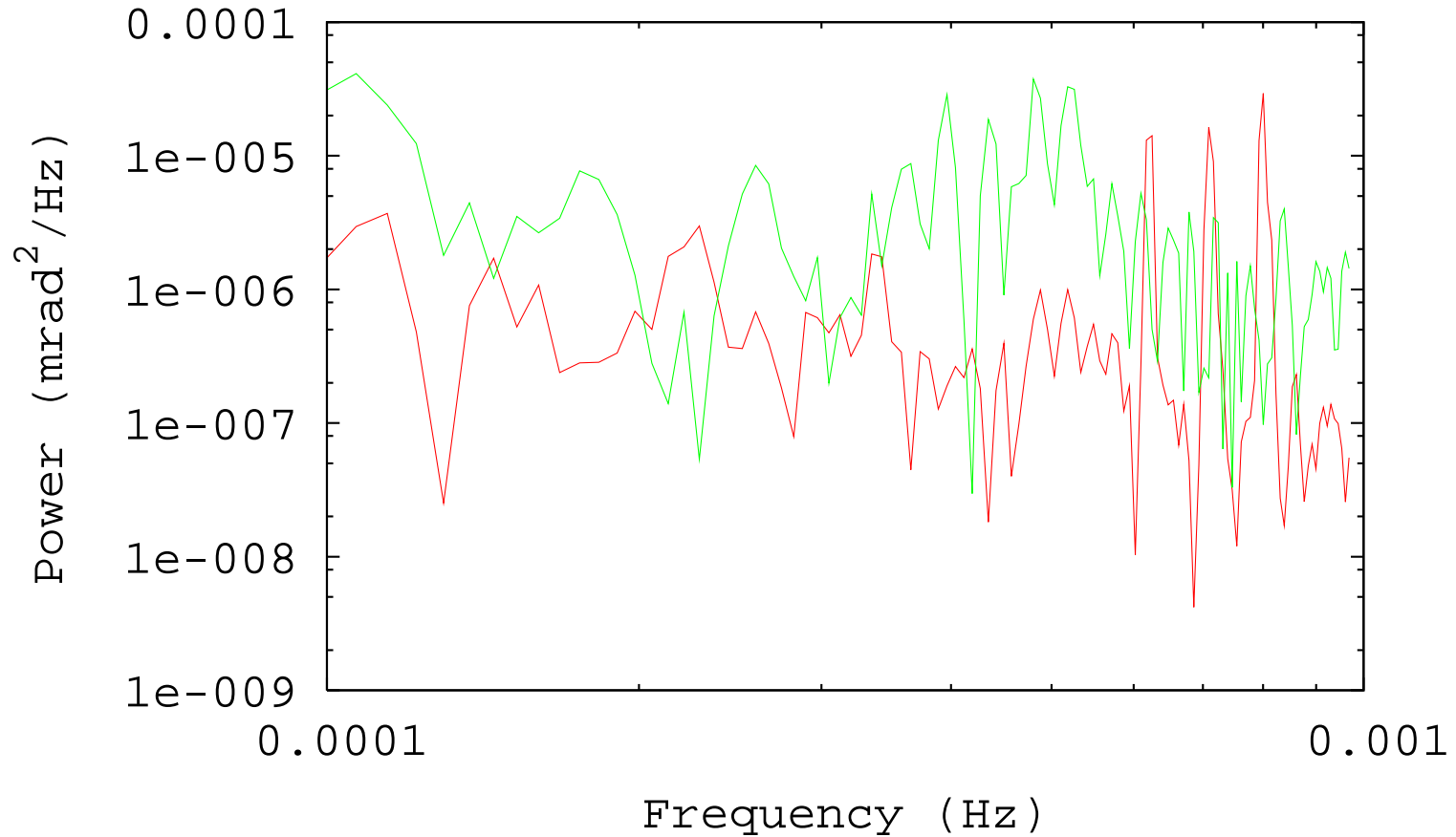


Voltage vs. Time

7/20 Raw Data Fit

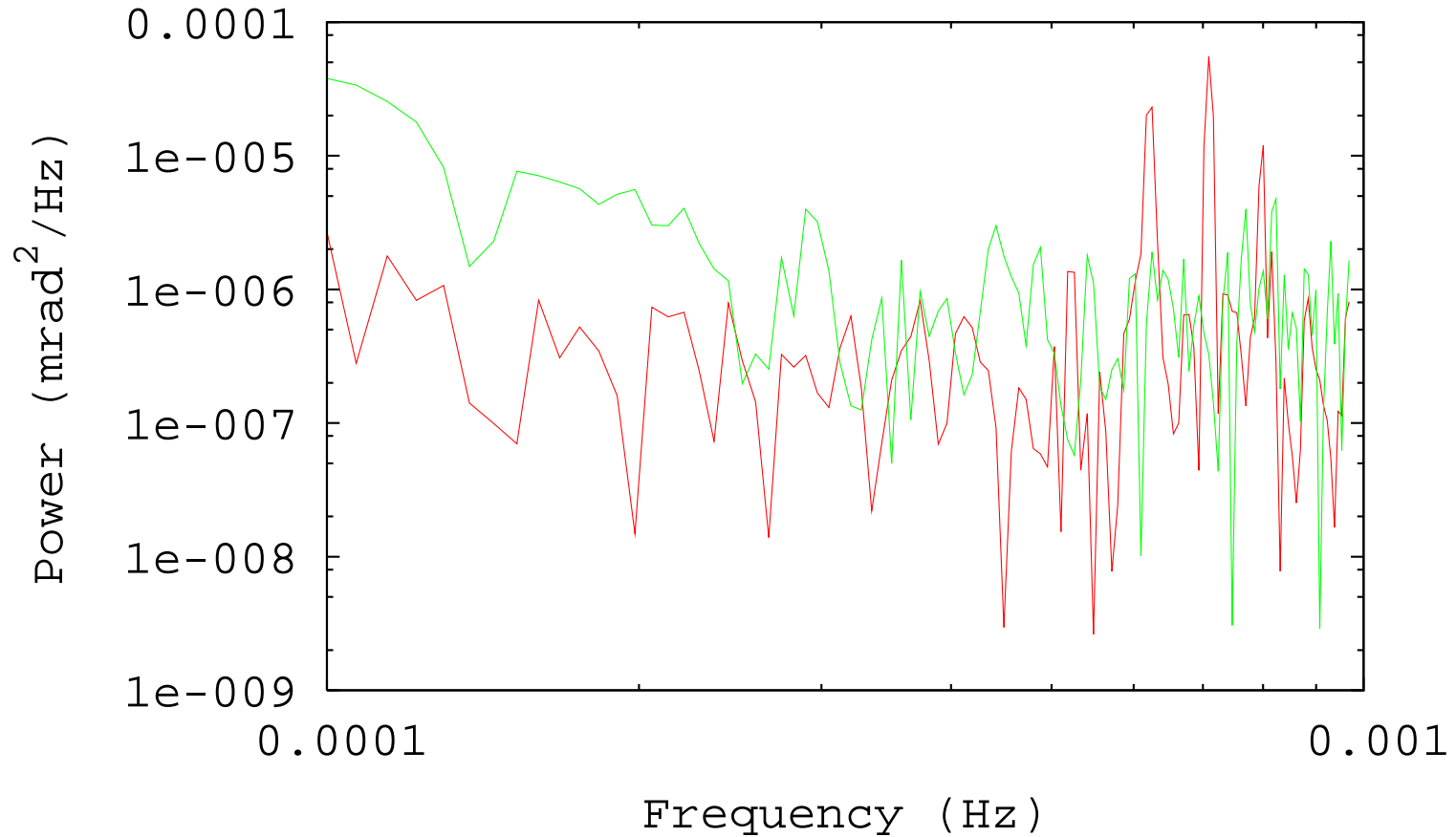


X Component of Tilt



Rotating Tilt Sensor ———
Stationary Tilt Sensor ———

Y Component of Tilt



Rotating Tilt Sensor ————
Stationary Tilt Sensor ————

Acknowledgements

Eric Adelberger

Charles Hagedorn

Blayne Heckel

Ki-Young Choi

Jens Gundlach

Hank Simons

Stephan Schlamming

David Hyde

Lisa Goodenough

Allen Myers

Erik Swanson