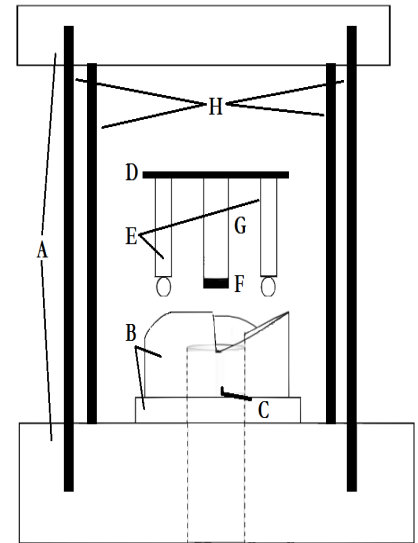
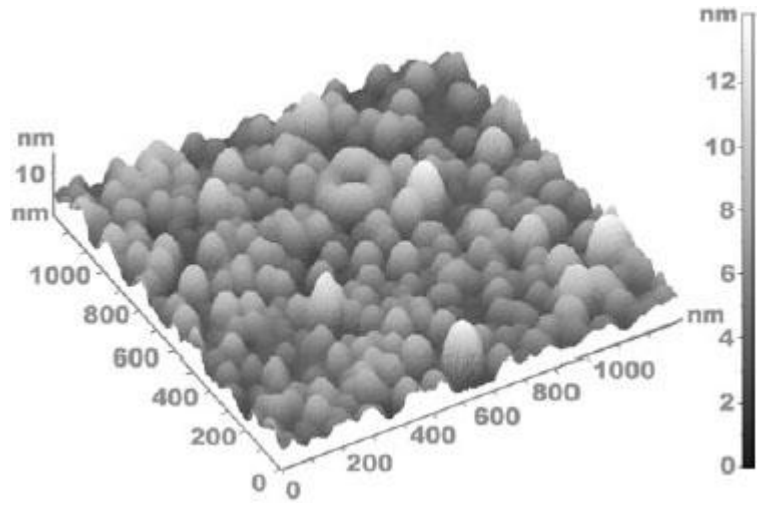
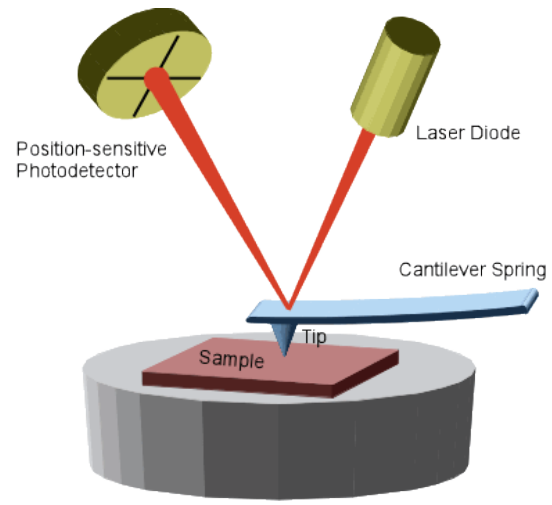
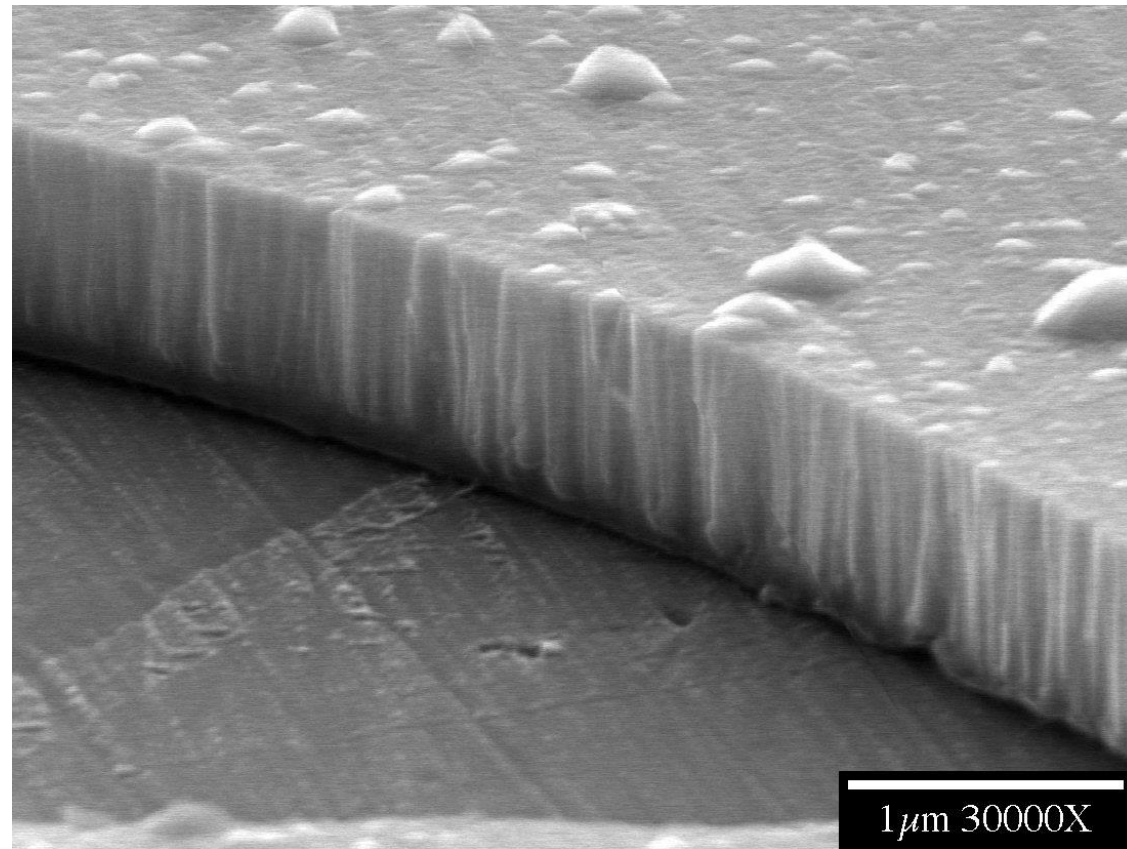


# The Design and Construction of an Atomic Force Microscope

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EMILIE OCOCK & BRANDON HOFFMAN





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# Motivation

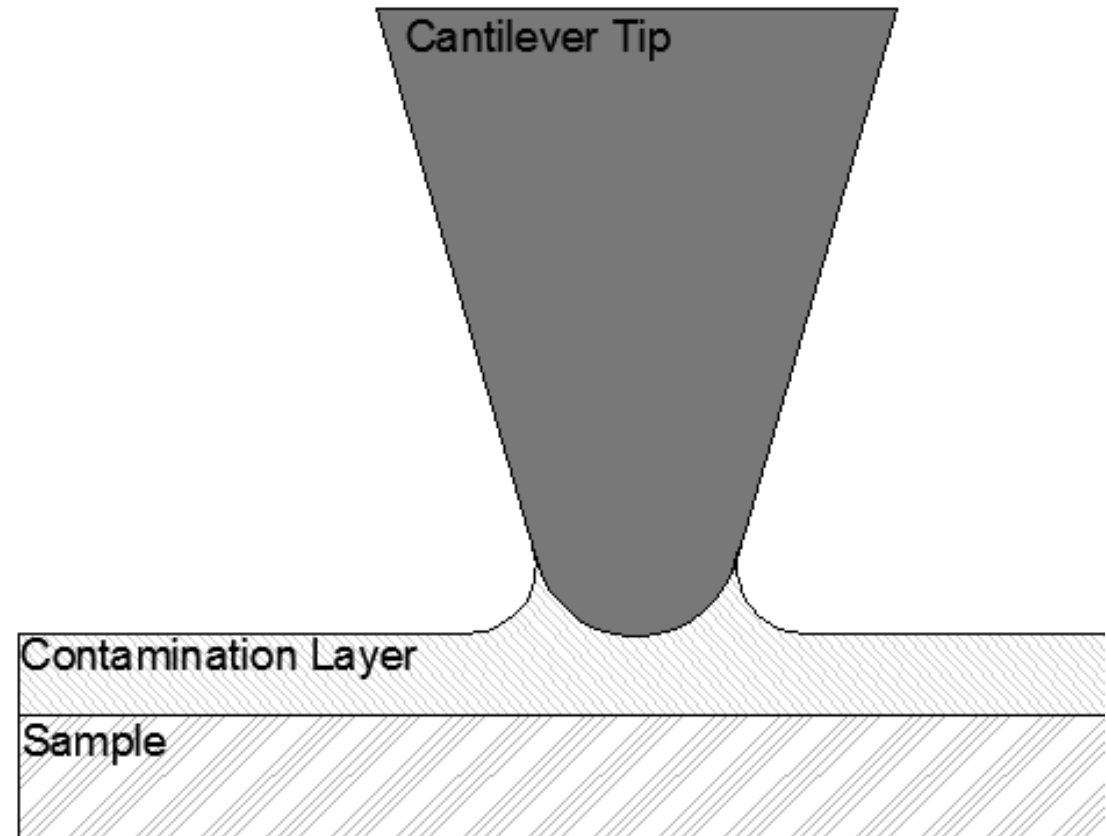
<http://www.buffalo.edu/content/dam/www/news/imported/hires/GarveyZnOPolymer.jpg>

# Tip Sample Interactions

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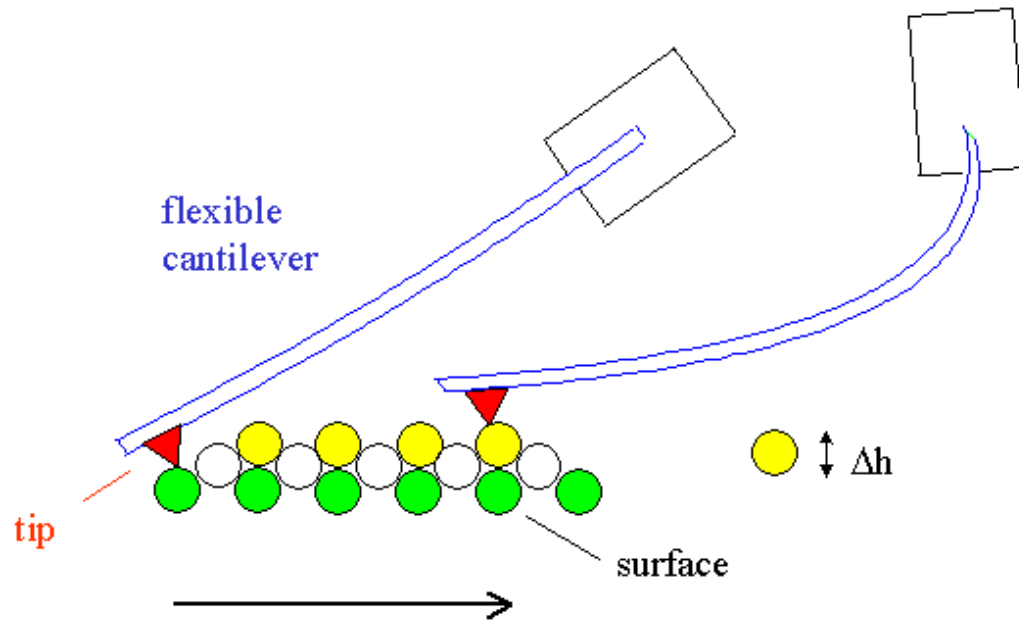
## Forces

- Capillary Forces
- Electrostatic Forces
- Van Der Waals Forces



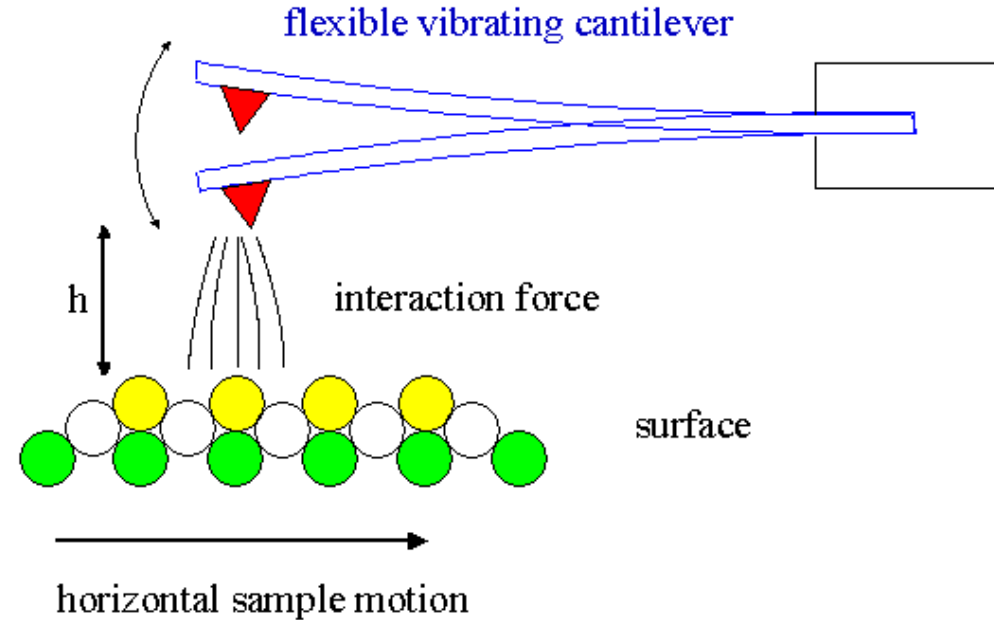
# Methods of Operation

## Contact Mode



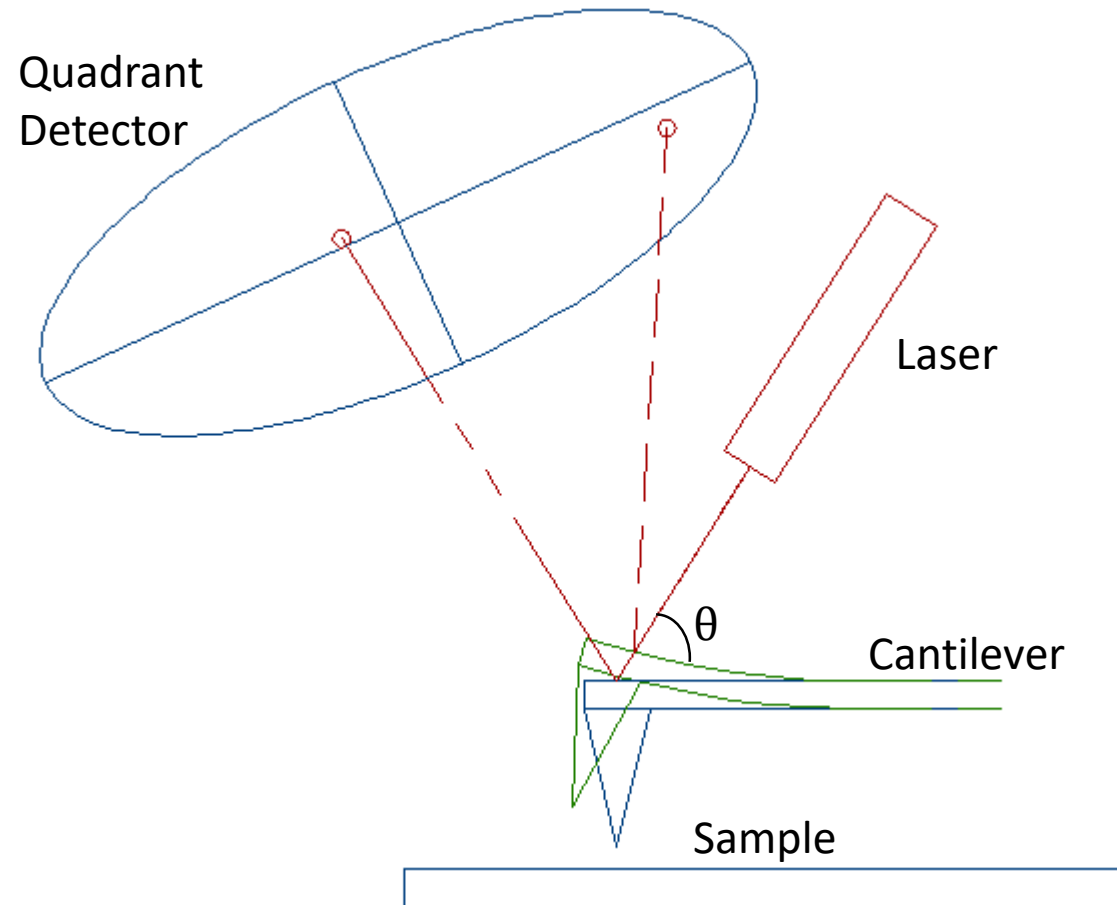
[http://www.mf.mpg.de/en/abteilungen/dosch/barrena/spm-principle\\_en.shtml](http://www.mf.mpg.de/en/abteilungen/dosch/barrena/spm-principle_en.shtml)

## Oscillation Modes



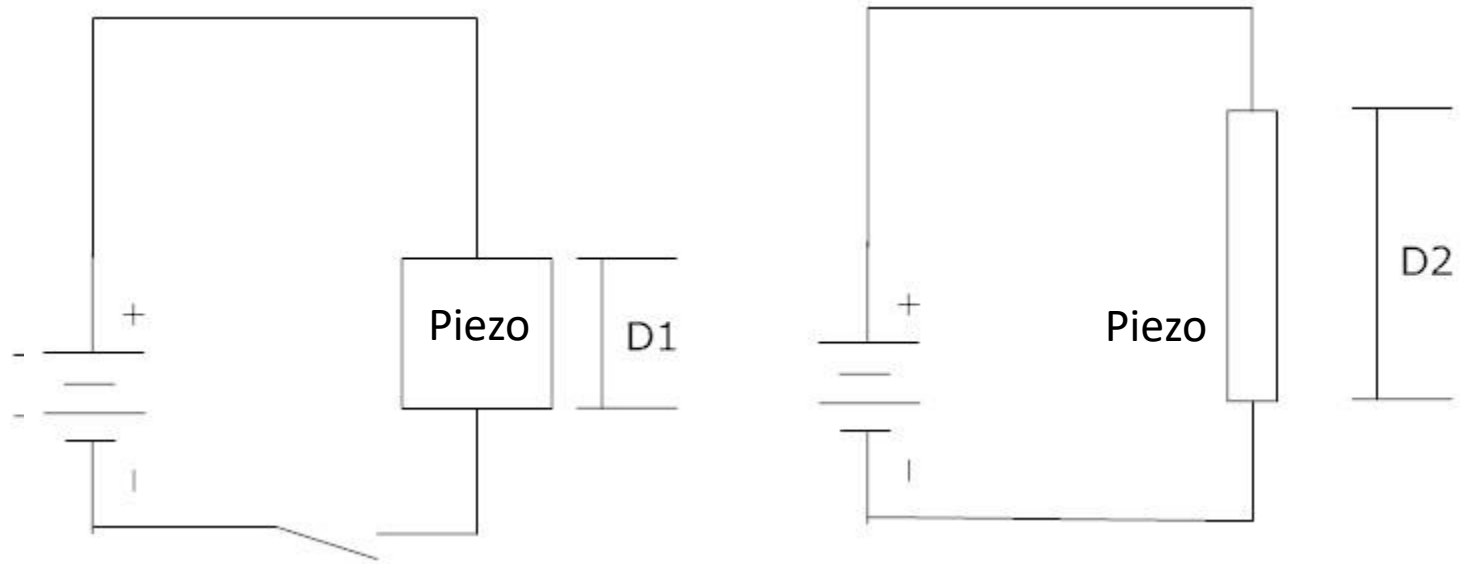
# Movement Detection

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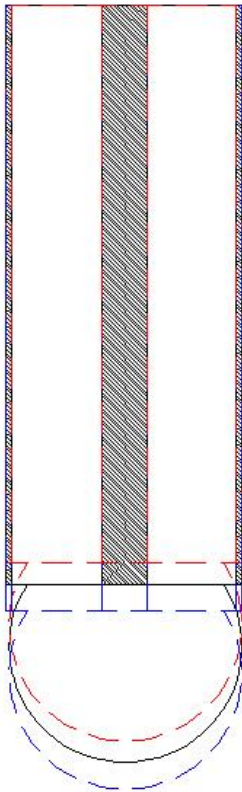
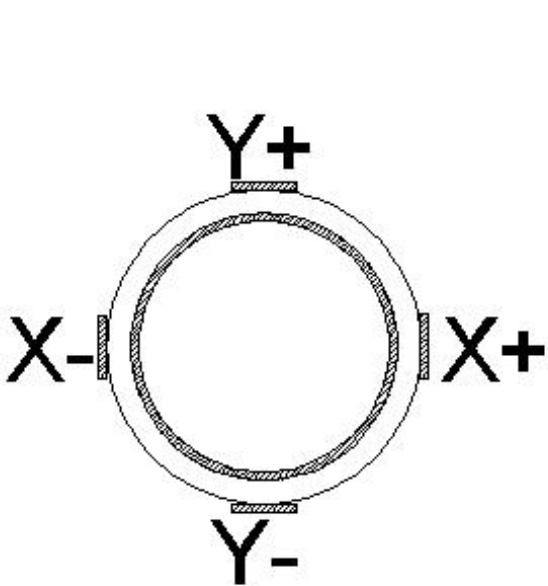
# Piezoelectric Theory

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# Piezoelectric Tubes

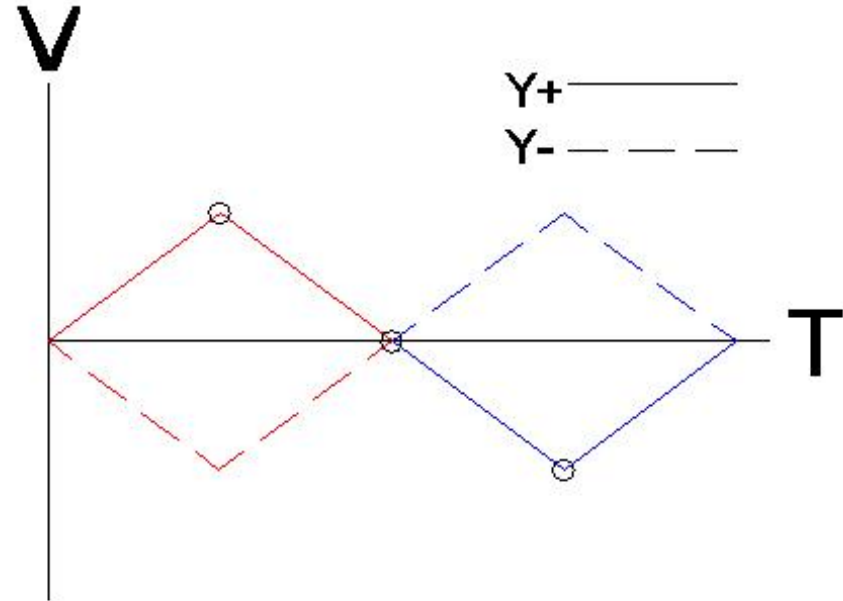
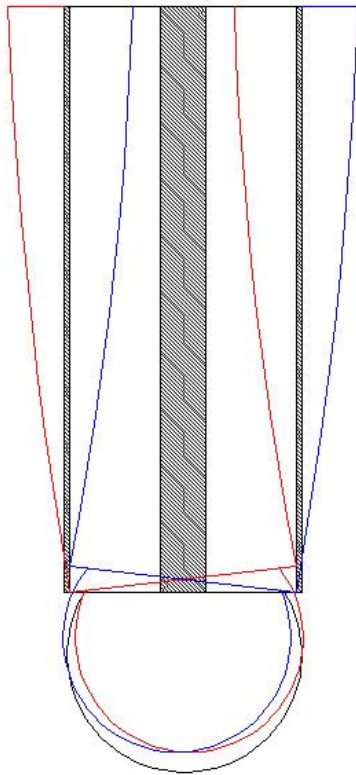
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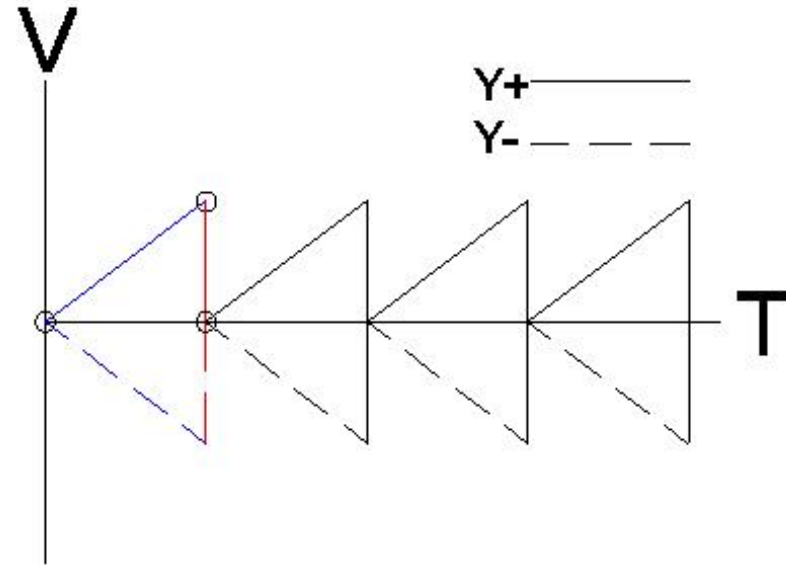
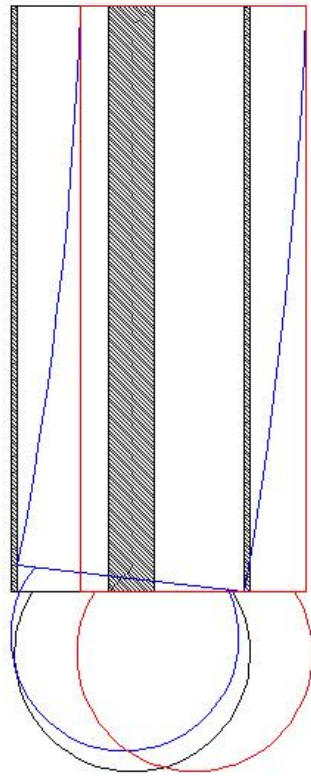
# Rocking Movement

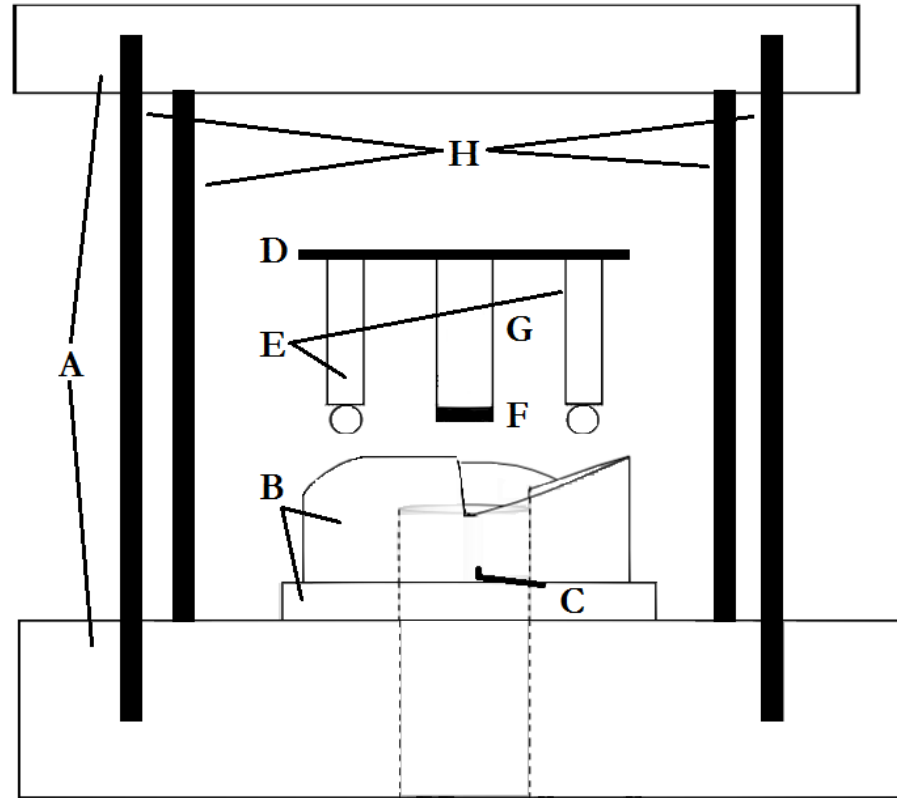
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# Stick Slip Movement

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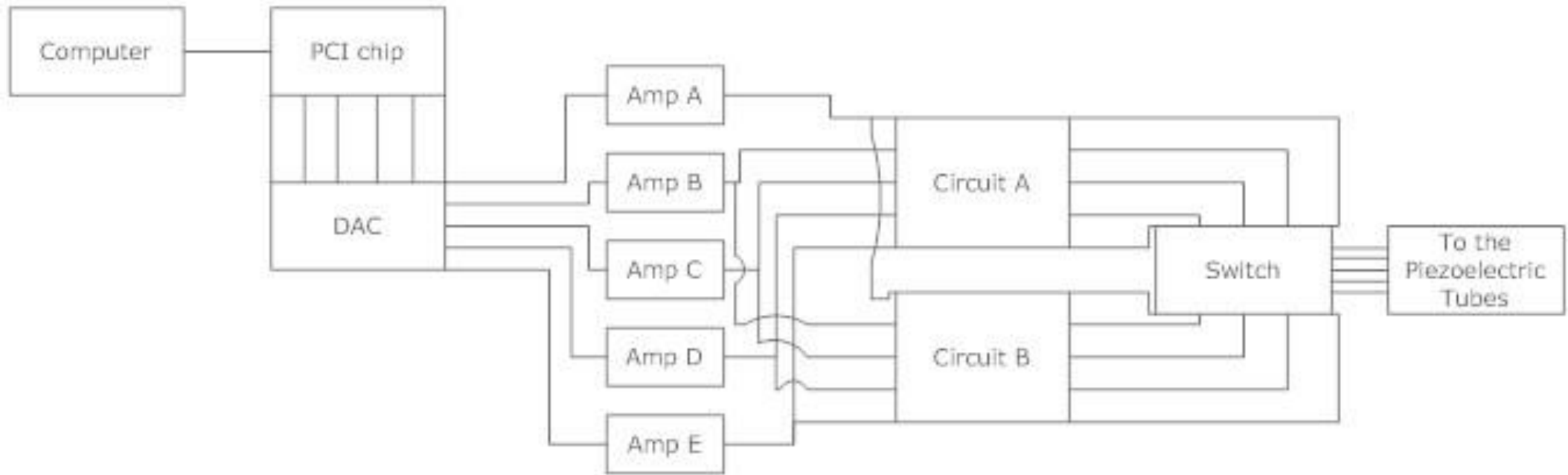




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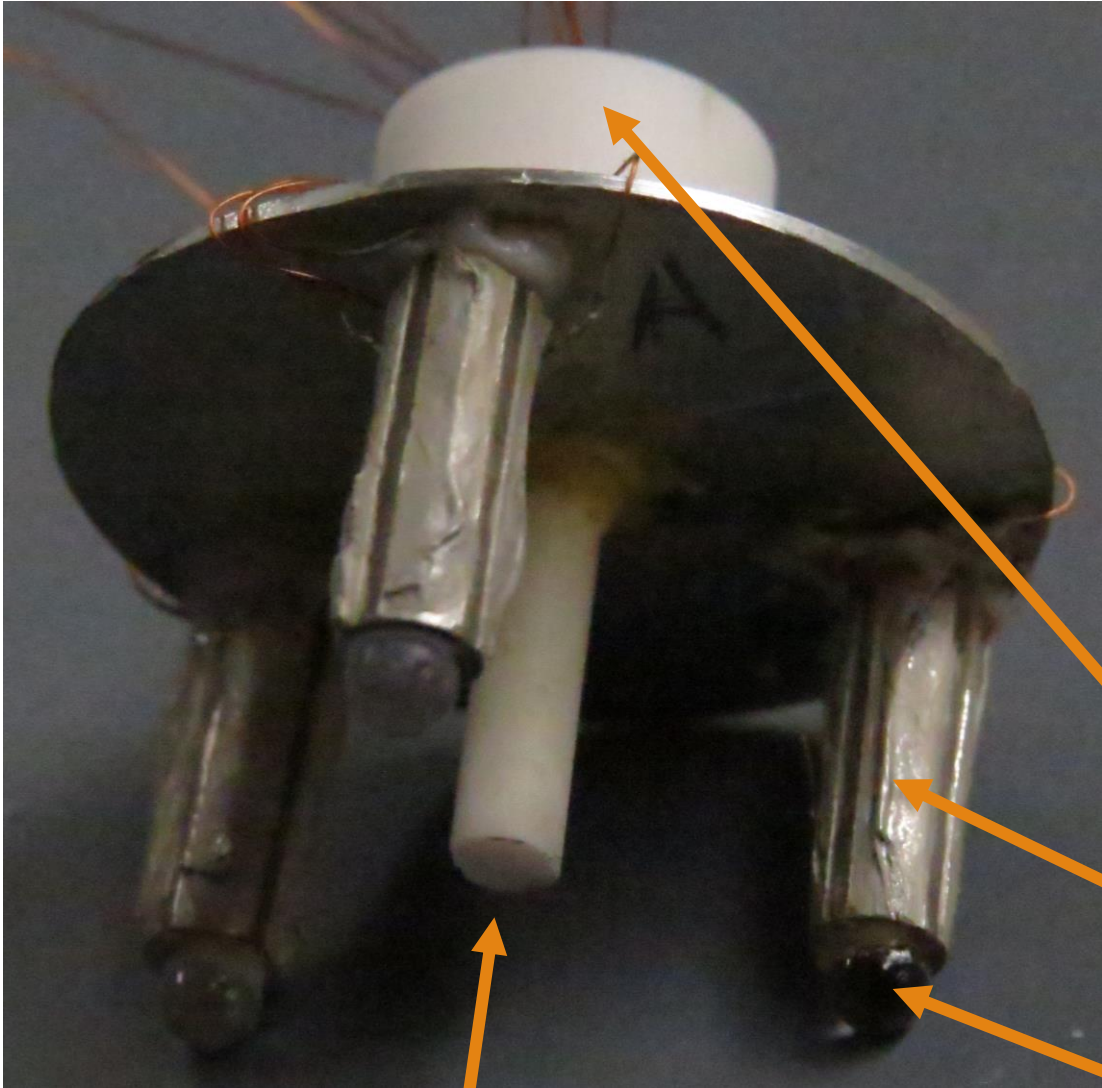
# The Houghton AFM

A. FRAME, B. RAMP, C. CANTILEVER, D. "JOHNNY WALKER," E. PIEZOELECTRIC TUBES AND SAPPHIRE BALLS, F. SAMPLE, G. SAMPLE HOLDER, H. ISOLATION SYSTEM

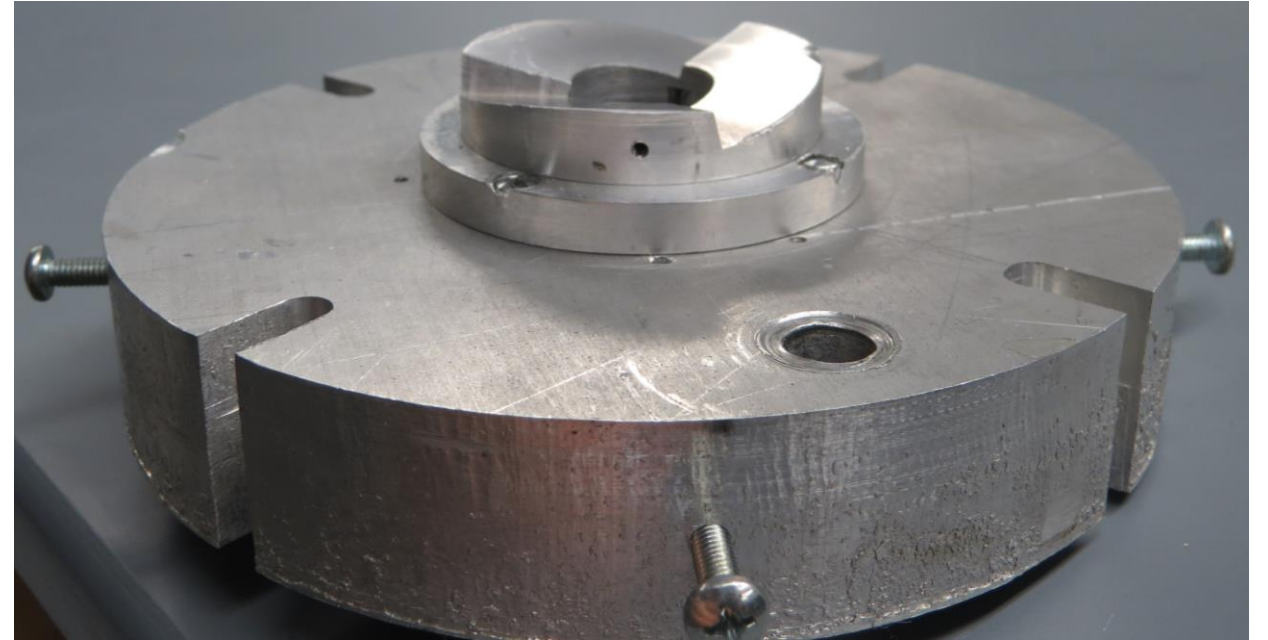


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# My Work



Sample Mount



Input wires from the program

Piezoelectric Tubes

Sapphire Balls

# Summary/Future work

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## Summary

### Designed

- A LabVIEW Program that controls the “Johnny Walker”
- A Digital to Analog signal converter

### Constructed

- Approach and scanning circuits
- Computer through “Johnny Walker” setup

### Tested

- LabVIEW program
- Circuit up to the “Johnny Walker”

## Future Work

### Designing

- Laser Optics System
- A LabVIEW Program to control all subprograms
- Cantilever System

### Testing

- “Johnny Walker”
- Optics System
- Complete Program

### Calibrating

- “Johnny Walker movements
- Optics Accuracy

