

# Heavy

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In order to take a picture of the surface of something at a very small scale—molecule by molecule, even atom by atom—you can use an Atomic Force Microscope, or AFM.

It works much like a record player. It has a very sharp needle that drags back and forth across the surface of interest. As the needle scans, the microscope determines how much the tip is moving up and down and creates a kind of topographic map, with lumps of molecules as big as mountains.

When making images at atomic resolution, minute vibrations can screw things up pretty badly. During imaging, if a door gets slammed down the hallway it makes a mess of the picture.

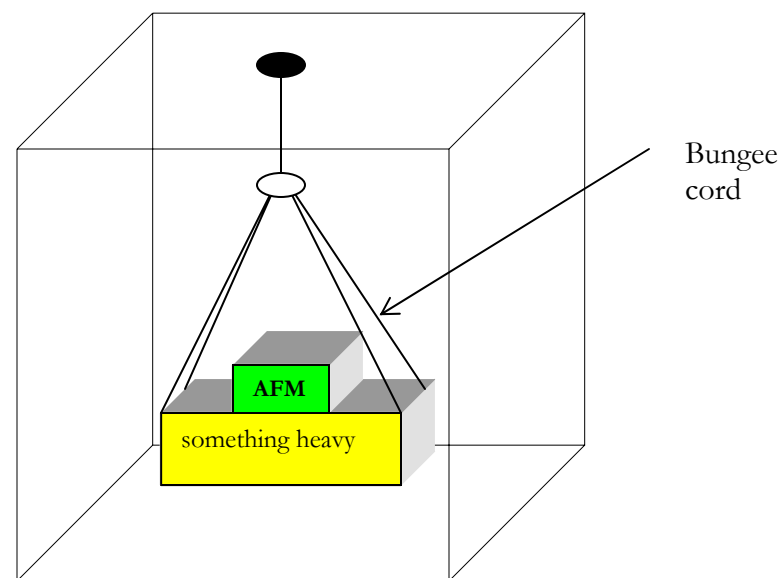
There are three ways to eliminate some of this vibrational noise from the system. One is to buy a Digital Instruments VT-102 Vibration Isolation Platform. The VT-102 uses compressed air in pneumatic isolators to provide the high level of damping required for optimum isolation of high ground noise, which is to say the VT costs more than many perfectly respectable cars.

Which leads us to the second way: wait until they start hiding VT-102's in specially marked boxes of Frosted Flakes.

The third way to get rid of the shakes is to suspend something heavy from bungee cords and set the imaging components of the AFM on top of that. The tiny undetectable vibrations inside any building get eaten up by the big mass and the taught bungee. It's the same as tying a big river rock on the end of a rubber band and holding it up off the ground. No matter how much Jolt cola you drink and how much your hand

quakes as a result (Kids, Jolt is for adults. If you're interested in trying this experiment, smoke crack instead of drinking Jolt) the rock won't wiggle. All the big mass can manage are long, lazy ups and downs, or low frequency noise. This kind of noise doesn't really bother the AFM.

Here is a picture of the device:



My boss, Jim, and I had already procured a big cage in which to string up the whole contraption. The necessary parts, including bungee cord, hoists, bolts and clamps cost about two-hundred bucks. Though the device seems crude and archaic, Ph.D.-level scientists swear by it because it does a better job than the VT-102.

So. All we needed was something heavy. Where does one go to buy something heavy? Jim and I tried five different stores before we found it. Our first stop, an industrial hardware store, suggested another hardware store where maybe we could find a thick plate of steel or a concrete garden stepping stone.

They didn't have either.

We visited a marble yard. We were treated to an impromptu lecture on Italian marble quarries and their gorgeous yields. The showroom was filled with countertops like frozen milk swirled with ash.

Finally, at a landscaping equipment store, we walked around to the back of the building and found just what we needed, in stacks. Big gray concrete stepping stones, cut into squares and flat on both sides. 12 inches x 12 inches and 2 inches thick. The pile was ridden with cobwebs. We reached in and each picked out a block. We hauled them inside. A dirty man with a crooked, bulbous nose and a filthy mesh baseball hat met us at the counter. He was running his grimy hands across the whiskers on his neck.

Jim and I were well dressed. I in khakis, he in slacks. Nice belts, shoes, socks, haircuts, etc. Carrying our cumbersome, dusty blocks, we surely looked as suspect as two homeless men toting Prada purses.

The cashier produced a pad of carbon-copy receipt tickets from a drawer and begin filling one out. Two stepping stones, tax included, cost us three bucks and change. Jim handed over a five. The man split open a new roll of dimes to make change. He leaned against the well-worn countertop (neither marble nor Italian) and with his free hand removed his hat. His hair looked like the bristles of a thick paintbrush dipped in black paint, scrunched up and let dry.

“You gentlemen mind me asking just what you plan on doing with these?”

Jim said, “no.” He looked at me. “They’re going to be part of a vibration filter for improved imaging with an Atomic Force Microscope.”

The man nodded and replaced his hat, tugging it down his forehead to form a tube around his eyes.

“Yep. Sell a lot of these suckers for that very reason.”