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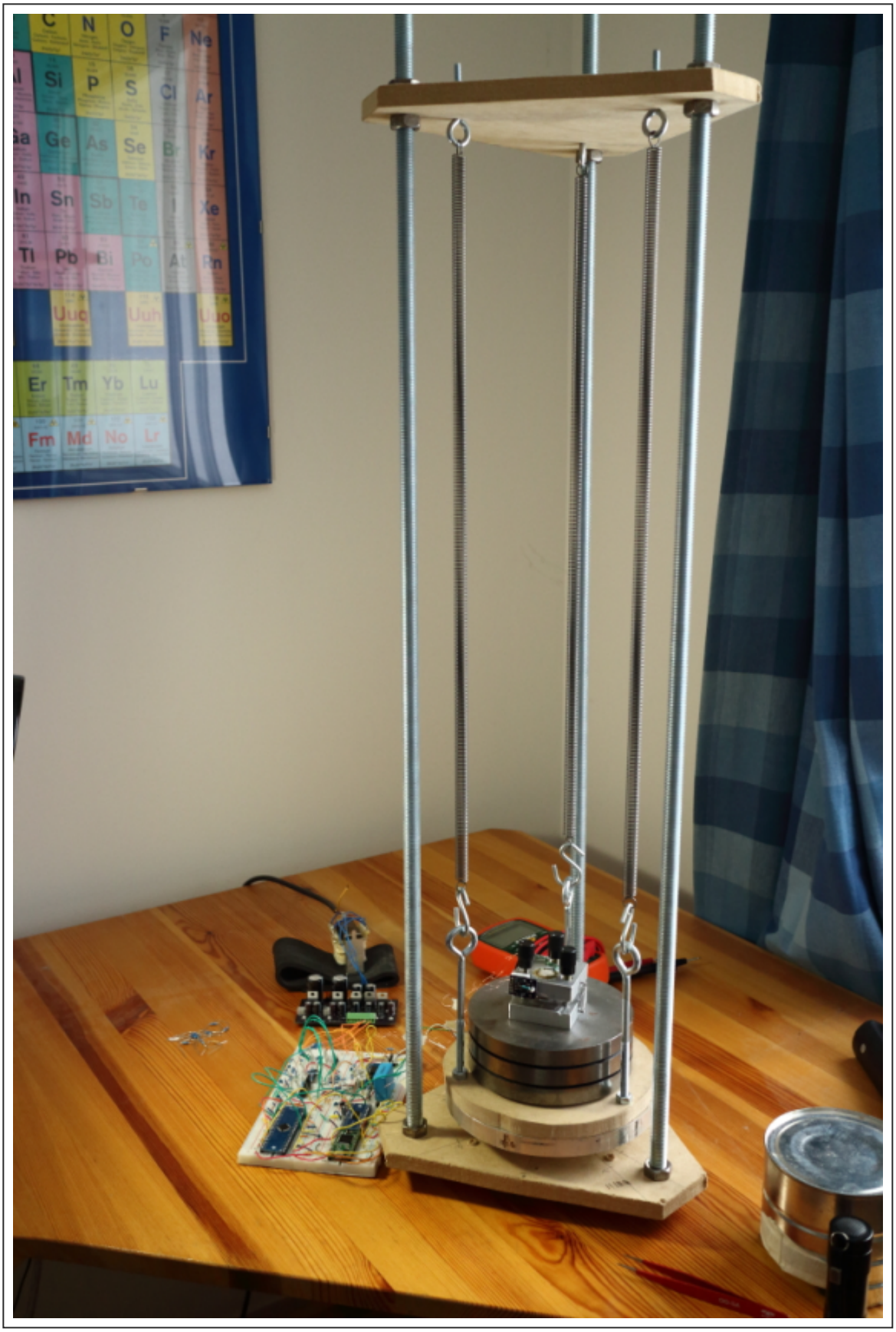
Good vibration isolation and damping are essential for STM. Since the STM scan head is fairly rigid, low frequency oscillations will only cause the entire STM head to oscillate, without affecting the tip-sample distance, but higher frequencies will cause problems. I live near a highway and airport, so I went for a fairly elaborate setup.



vibrational components) and a harmonic oscillator with a 2 Hz resonant frequency (isolates from vertical vibrational components). I've also attached three stacks of three hard drive magnets to the base which, when brought close to the aluminum plate, provide some eddy-current damping. As the aluminum plate moves in proximity to the magnets (in any direction), the changing magnetic field seen by the plate induces eddy currents in the plate. The eddy currents generate a magnetic field that opposes the motion of the plate (by attracting or repelling the hard drive magnets), which effectively acts to dampen vibrations. I also use very fine 40 AWG wires to connect the scanner, preamplifier and sample bias to the electronics on the breadboard to minimize vibration transmission. The whole device sits on little rubber feet.