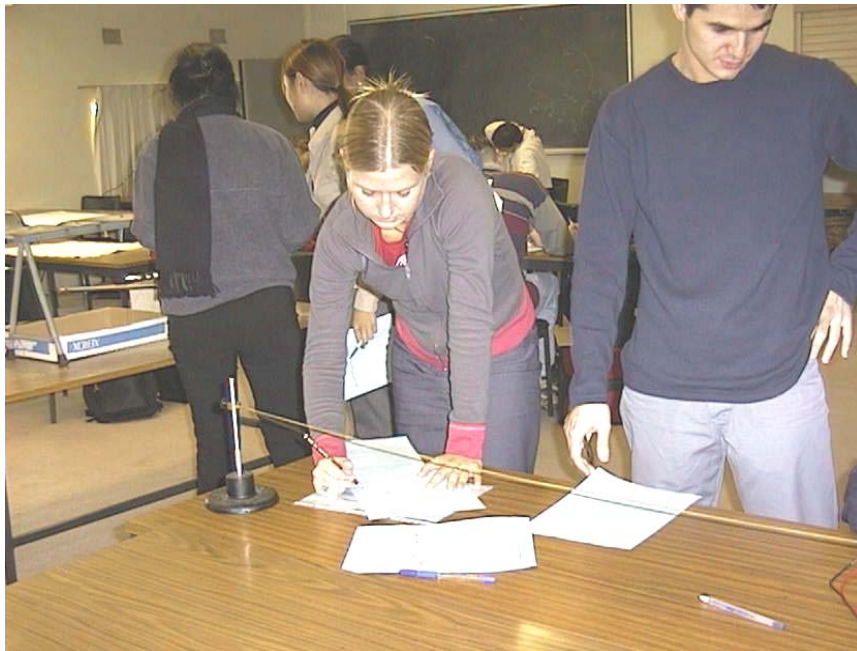# Standing Waves on a String

Apparatus

taut cord or wire attached to oscillating driver with frequency control, the driver with amplifier is attached to one end of the cord, the other end is fixed.

Action

The students vary the frequency of the oscillator to produce standing wave patterns. They can vary the tension in the string by stretching it and see the effect that this has on the frequencies required to produce standing waves.

The Physics

The standing wave is set up by the superposition of waves traveling from the oscillating end of the string and waves reflecting back from the fixed end. Only certain wavelengths are possible for the standing waves; $\lambda = 2l/n$, where l is the length of the cord and $n = 1, 2, 3\ldots$ The velocity of the wave is fixed by the properties of the string, so the frequencies at which standing waves occur are $f = v/\lambda = nv/2l$.

Students at the University of Sydney making waves on a string.

Accompanying sheet

Standing Waves on a String

Change the frequency to find harmonics and
sketch the patterns on the string.
How are standing waves formed?

How many harmonics can you see?

Change the tension and see what happens.
How does the pattern change?