Acoustic complex reflection.

Students will study reflection and transmission of sound in a tube. They will do this with the equipment shown below.

In addition to the usual simple reflecting mediums for sound studied in the “Waves” General lab, students will attempt to design and build a matched load from cardboard and foam, and design and build a Helmholtz resonator to be fitted to the end of the tube. Students will study the reflection of sound by these end pieces, and by a flange, in particular, producing a profile of the frequency dependence of the complex reflection coefficient, paying close attention to marked transitions in the behaviour. Students will first predict how they expect the complex reflection coefficient to vary with frequency. Finally students will investigate how these reflective properties are exploited in musical instruments, and the design of sound proof labs and concert halls.