



Figure 10: The speed is measured by chopping the beam and detecting the loss of signal. The chopper consists of an electric motor (Portescap, 22S) with a pair of metallic blades attached. It normally runs at 6000 RPM. The sensor, which determines the position of the chopper blades, has a phototransistor illuminated by an LED. When a blade is in the path of the light it is detected by the phototransistor as a high impedance state and at the same time the opposite blade is in the path of the cluster beam. The distance between the blades and the detector is known ($L = 2.45$ m) and we measure the time between the chopping of the beam and the detection ($T_2 - T_1$) to determine the speed.