Using the laser gate

Setting up and Checking the laser gate

1. Before turning on the computer make sure that all usb connections are plugged into the computer: the flash drive, if used, that contains the boot image, the usb cable from the laser gate, and the usb mouse and usb keyboard if used.

2. Turn on the computer, and boot from the CD or usb drive.

3. The computer will boot up into "Puppy Linux". Accept the settings by clicking "OK". You should not need to change them if you are using our computers.

4. To check if the gate is working, have the laser strike the IR diode detector. When it does, the red LED should light up. When you block the laser, the LED should turn off. If the LED goes on and off when you block and unblock, then the gate is working.

Shutdown

To shutdown, go to the menu, choose "shutdown", and click "power off computer". **Do not save your session**.

The software for the Experiments

- **conacc**: Use this program if you suspect that the motion will have constant acceleration or angular acceleration, i.e. Atwood Machine, ladder drop, or rotational dynamics.

    1. Click once on the icon conacc.desktop. You will be given some options.
    2. Type "z" to change the number of blockings and to calibrate the gate.
    3. Enter the number of blockings N and the distance from the center of the first blocking to the center of the N'th blocking. Note: For the Atwood Machine the circumference of the pulley is 30.4 cm.
    4. Type "d" and enter to start collecting data. Be sure that you start when the laser gate is unblocked.
    5. After data collection, the data will appear on the monitor, and a file named data.txt will be created in the root directory. If you want to graph your data Click once on the icon graphdata.

- **graphdata**: This program is used to graph the data from conacc. It reads the data from the file data.txt, found in the root directory.

  1. Click once on the icon graphdata. A browser should open up.
  2. Click on the "browse" button, and select the file data.txt in the root directory.
  3. Click on "upload data.txt" and then click on "display data".
  4. The data should be entered in the columns, and plotted as well as the best fit line.

  When you run conacc again, you will not need to select the file data.txt, but you only need to click on the "upload" button and "plot data". You can leave both windows open at the same time, conacc and graphdata.

- **tandv**: This program is used to collect time and speed data, i.e. in our Conserved Quantities experiment. It is similar to conacc.

  1. Click once on the icon tandv.desktop. You will be given some options.
  2. Type "z" to change the number of blockings and to calibrate the gate.
  3. Enter the number of blockings N and the effective thickness of the blocking element.
  4. Type "d" and enter to start collecting data. Be sure that you start when the laser gate is unblocked.
  5. The time and speed data will be displayed on the screen, and a text file called tvout.txt will be saved.

- **linefit**: This program is a general linear fitting program.

  1. Click once on the icon "linefitjs". Fill in the data, and select the data points you want to include in the linear fit.
  2. Click on "fit it" to see the best fit line and to obtain the slope, intercept and their uncertainties.