ELP725
Wireless Communication Lab

Experiment No. : 8

Using GNURadio Companion to build

QPSK Modem on SDR04

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Submitted By :

Group No – 8

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Objectives :

- To build a digital baseband modem that can use Quadrature Phase Shift Keying (QPSK)
- To introduce the basic concepts of modulation and demodulation.

Equipment Required :

- 2 AMITEC SDR04 Hardware
- Log-periodic dipole and omni-directional dipole antenna
- 2 Computers with GNU Companion Radio installed

Observations :

1. Transmission and Reception (Without Antennas):

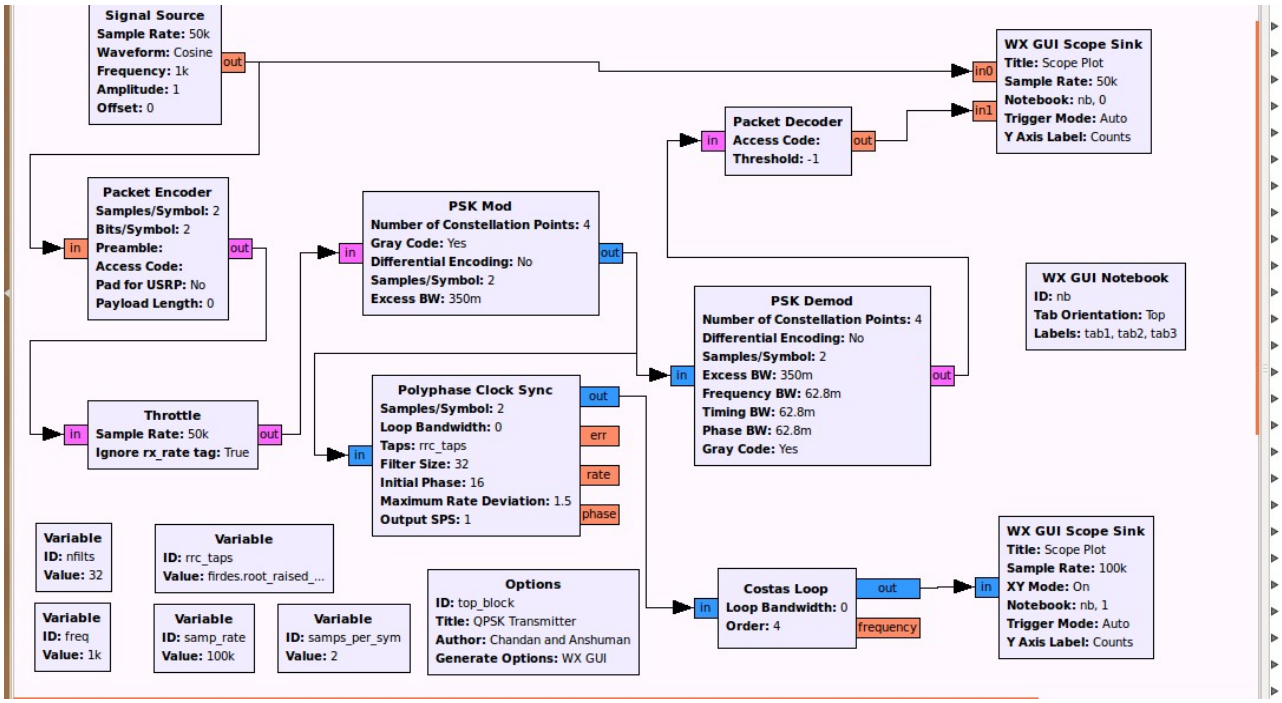


Figure 1: QPSK Simulation flowgraph

Figure 2: QPSK Input and Output signals

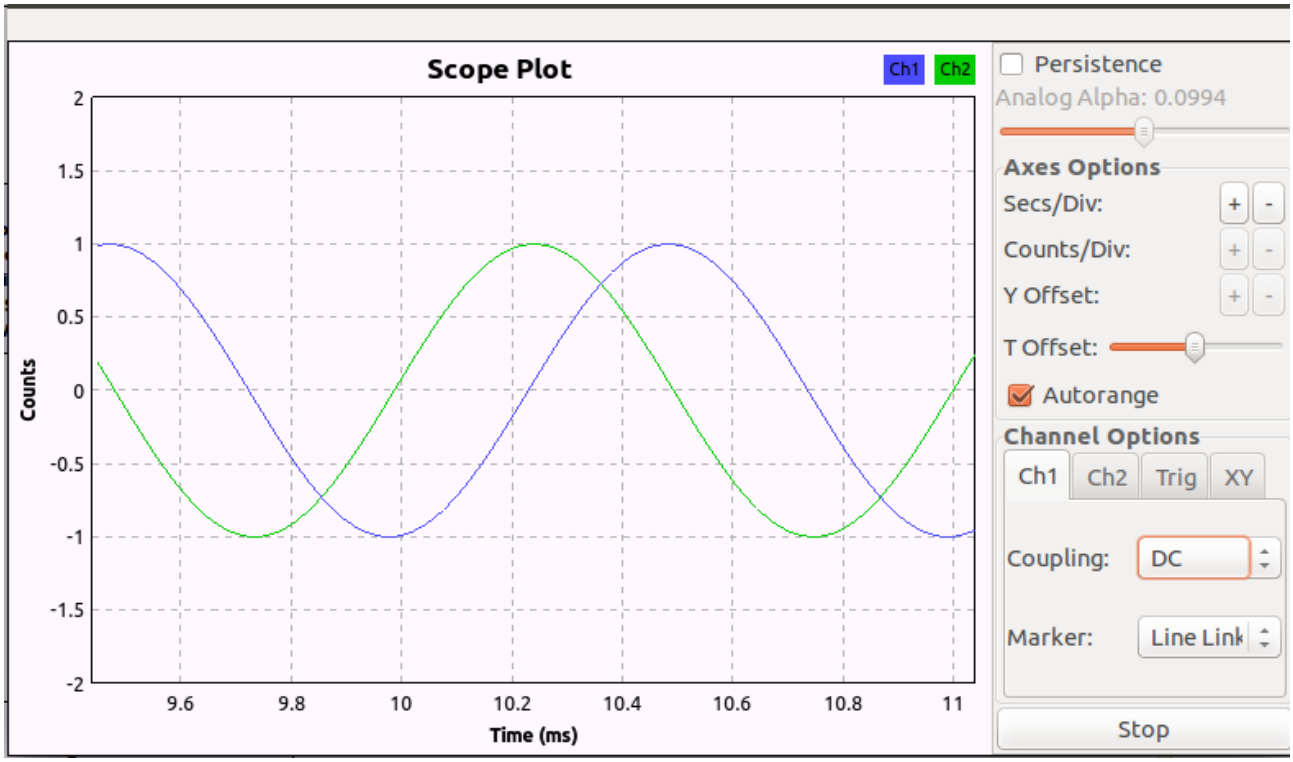


Figure 3: QPSK Constellation plot with Loop Bandwidth = 0.01

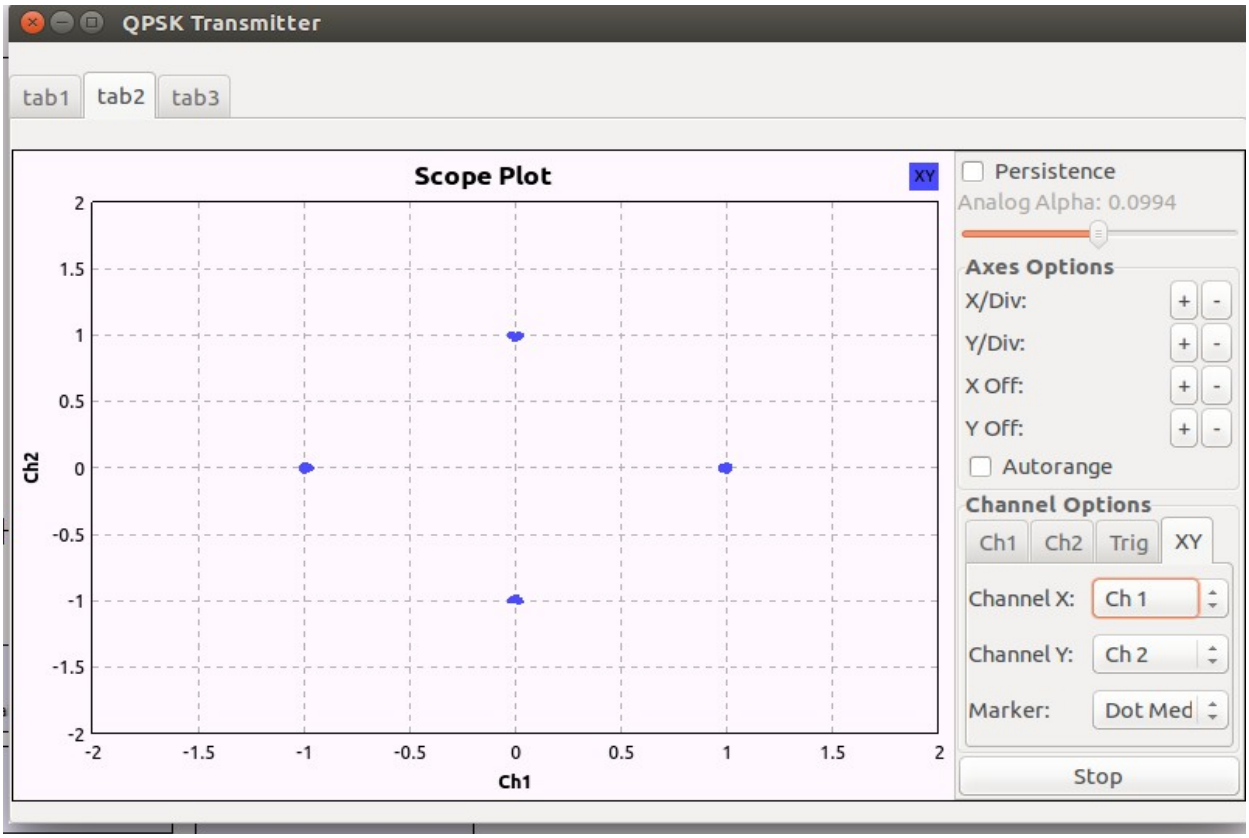
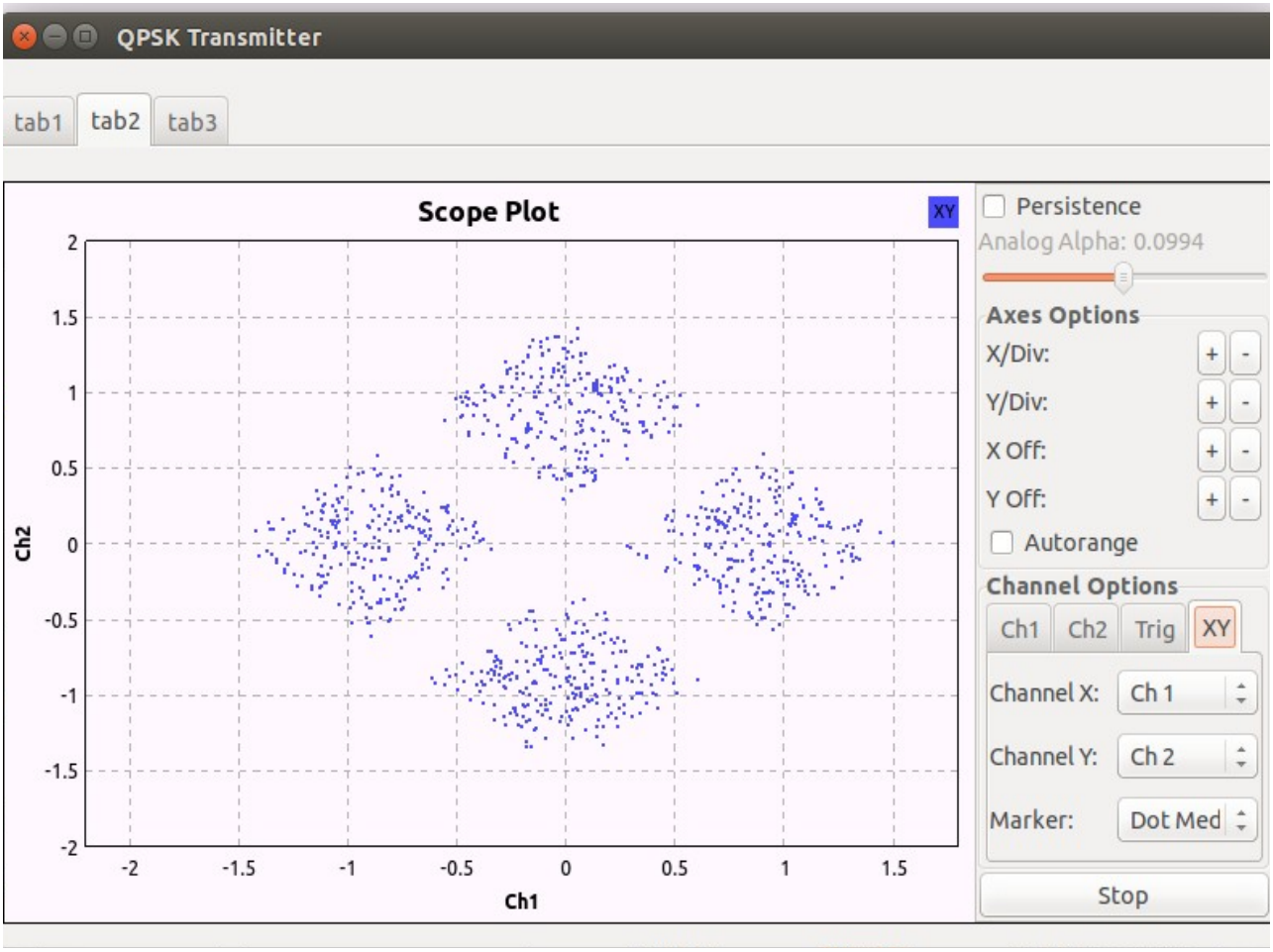


Figure 4: QPSK Constellation plot with Loop Bandwidth = 0



2. Transmission & Reception (with Antenna):

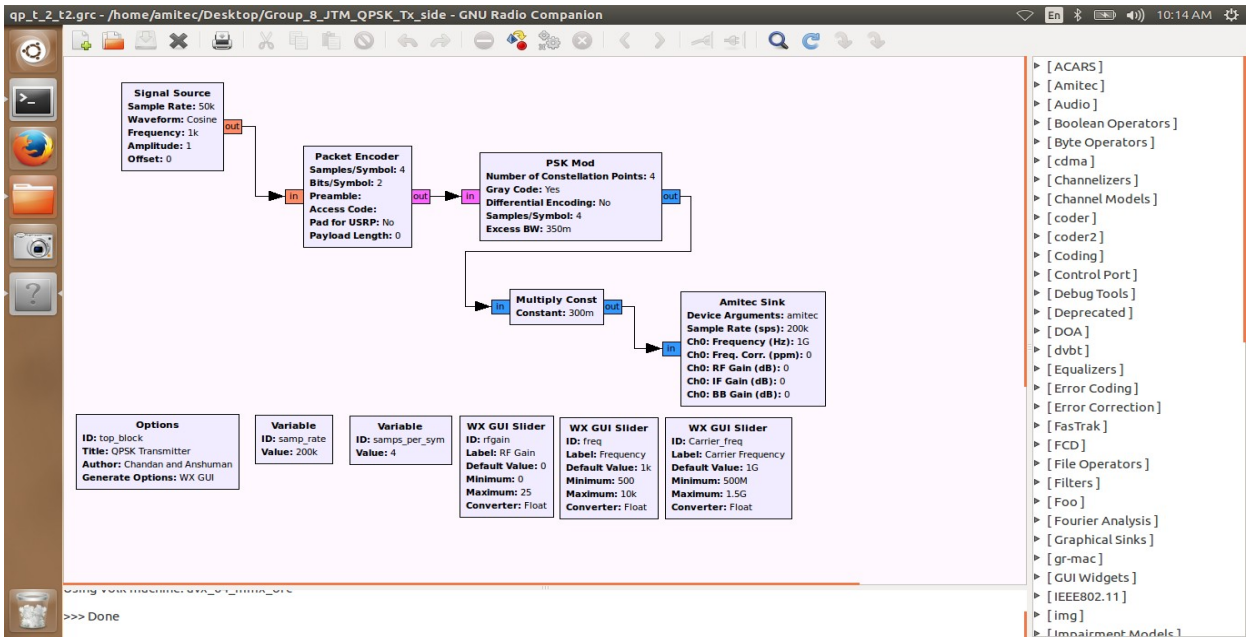


Figure 5: QPSK Modulator Flowgraph

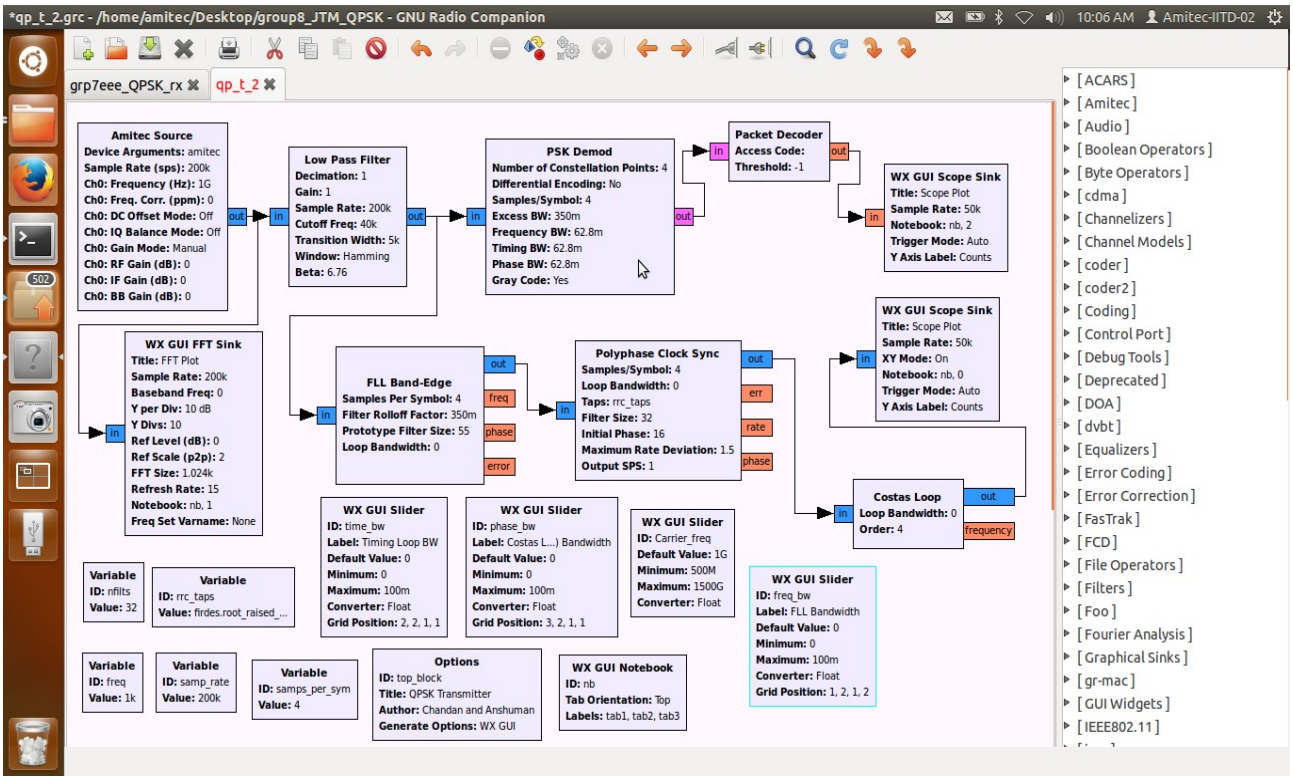


Figure 6: QPSK Demodulator Flowgraph

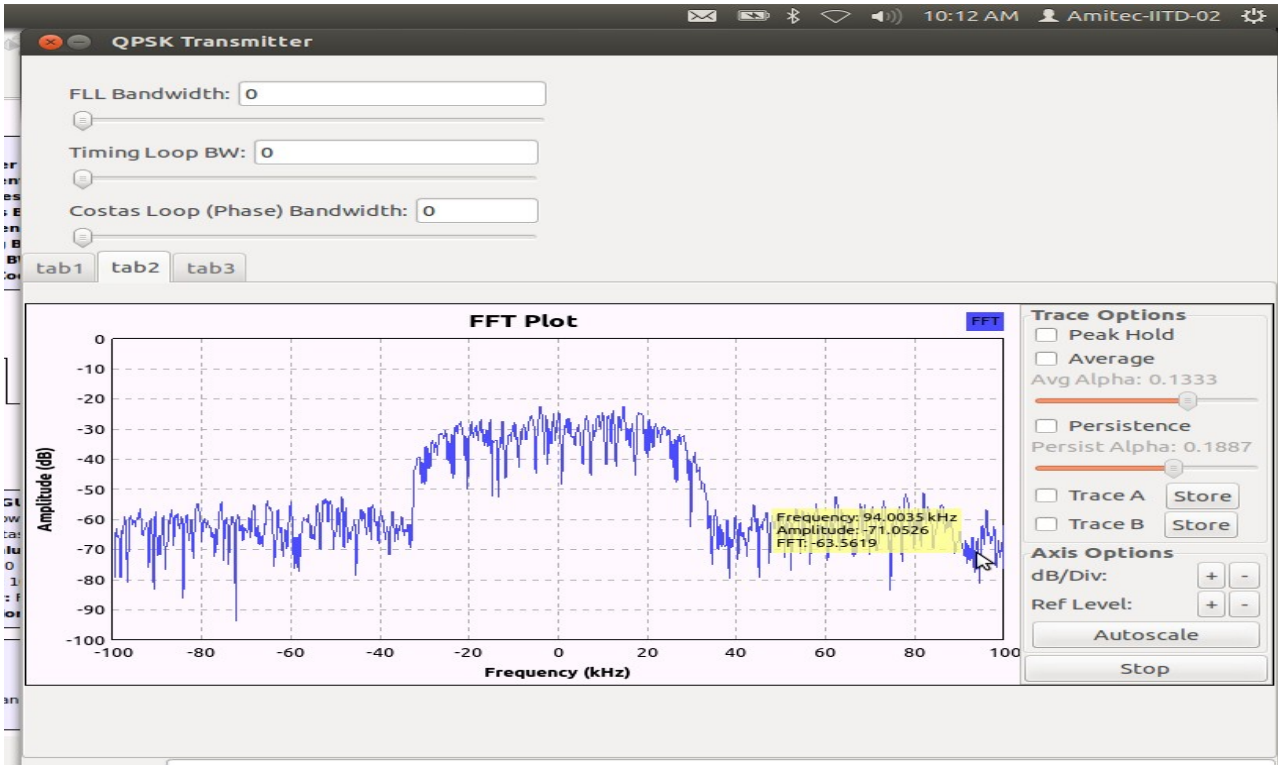


Figure 7: FFT Flowgraph

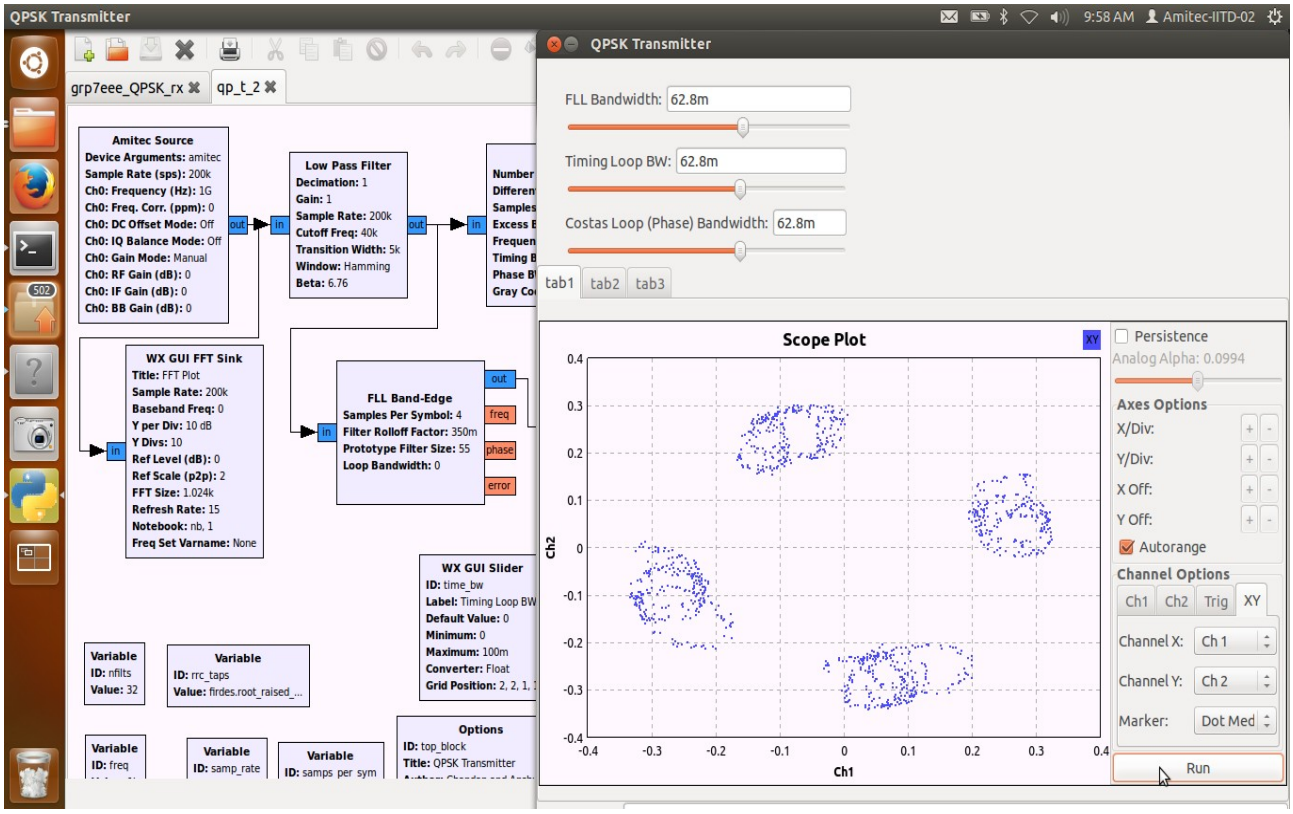


figure 8: QPSK Contellation plot

Analysis :

- In QPSK scheme, 1KHz modulating signal and 1GHz carrier signals are used along with RF gain slider at the transmitter side.
- All the signals before transmission are observed with the help of single amitec sink block.
- The received signal is passed through low pass filter with cutoff frequency of 50KHz.
- After the signal passes through the filter, it is passed through FLL BandEdge, polyphase clock sync and costas loop blocks.
- Finally the received signal is observed in two individual scope sink blocks.

Conclusion :

- The signal reception accurately depends on the filter frequencies used and directionality of the antennas used.
- The schemes are validated with the help of scope and FFT plots.