



# PCS QAM Project 2025

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# Problem Statement

- Design a 16-QAM system using two pulse shapes (square and sinc) for baseband modulation.
- Implement matched filtering and symbol detection.
- Add AWGN for SNRs in  $[0, 3, 7]$  dB and evaluate BER.



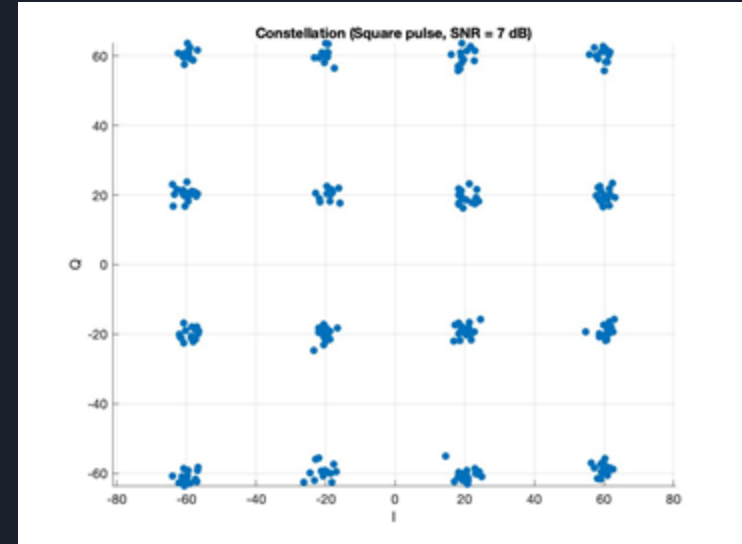
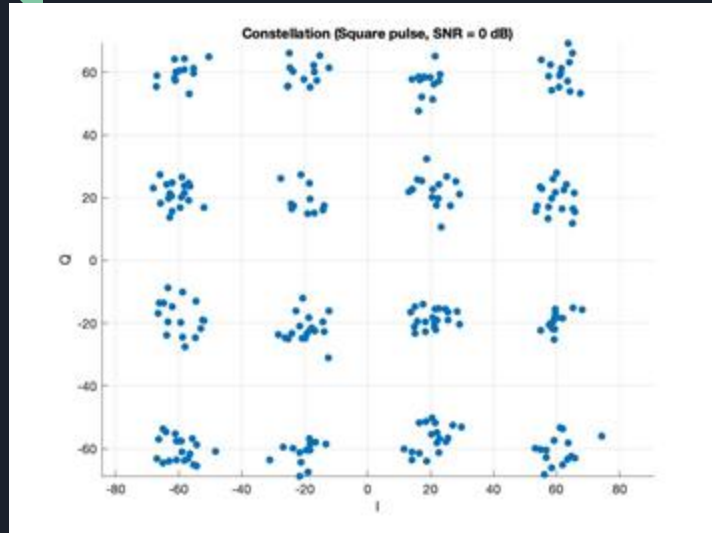
# Applications

- Wi-Fi (802.11 standards)
  - Most Wi-Fi networks (like 802.11ac and 802.11ax) use 64-QAM, 256-QAM, or even 1024-QAM
  - Higher-order QAM = higher speeds (assuming strong signal).
- Cellular Networks (4G, 5G)
  - LTE and 5G use QAM for downlink and uplink modulation
  - 4G can go up to 64-QAM, and 5G can go up to 1024-QAM
- Cable Modems (DOCSIS)
  - Your home internet via coax uses 256-QAM or higher for downstream data
- Digital TV and Satellite
  - Digital cable TV and satellite use QAM for transmitting compressed video data
- DSL / Broadband over Phone Lines
  - QAM is used in ADSL/VDSL to transmit high-speed internet over copper lines

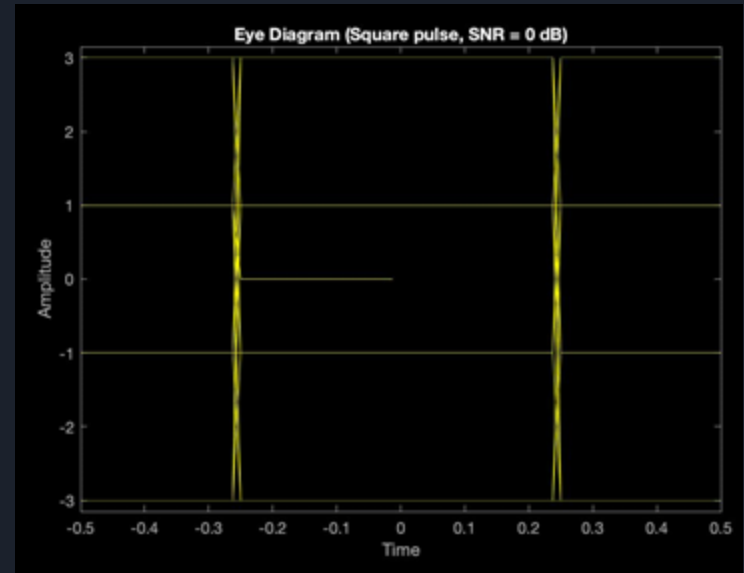
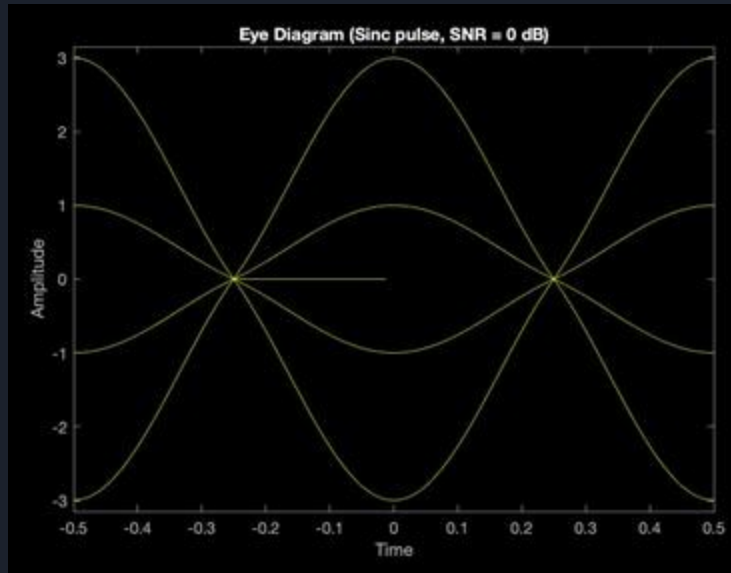
# Block Diagram



# Constellation Diagrams



# Eye Diagrams



The End

