

### III.I Powerpoint Charts

## Charts



# CoHerent Optical Integrated Receiver (CHOIR)

#### University of California at Santa Barbara

- Innovative record for novel devices and photonic integration.
- Excellent clean room capability allowing rapid device prototyping and fast photonic integrated circuit demonstration.

#### Northrup Grumman Space Technologies

- Extensive military systems experience and experience in designing for military environments.

#### Agility Communications Inc.

- Leader in advanced optoelectronic device design and integration.



## Technical Approach



- ▶ Linear Optical Phase-Lock Loop Demodulator
  - Phase demodulation using balanced receiver approach inherently non-linear
  - With a high-gain OPLL and a linear reference modulator, nonlinearities are overcome
  - Loop bandwidth limited by feedback delay; for ~1GHz high gain, high linearity operation, loop delay must be ~20 ps, corresponding to less than 1mm physical length.
  - Very compact, low group delay loop photonic and electronic components must be used
  - Indium Phosphide modulators attractive due to the very large available phase shift available in from a short length, down to a few hundred microns
- ▶ Highly integrated optoelectronic system
  - Loop delay restrictions require the application of highly integrated photonic and electronic circuits
  - Close integration of Photonic and electronic IC also required
- ▶ Optical Sampling Downconversion
  - Linear phase demodulation of RF signals up to 18 GHz is achieved using optical sampling approach
  - Optical CW source replaced by high-power mode-locked laser
  - Fully photonic downconversion → broadband nature of photonics utilized

