Outline

• Why PCs

• Ionization History $x_e(z)$

• Dark Energy Equation of state $w(z)$ Interrelated!

• Inflaton Potential $V(\phi)$

• Collaborators:
  • Cora Dvorkin
  • Dragan Huterer
  • Michael Mortonson
  • Hiranya Peiris
  • Earlier work with Gil Holder, Kenji Kadota
Why PCs

- **Principal components** are the eigenbasis of the projected or actual covariance matrix for a discrete representation of $f(x_i)$

- **Rank ordered in observability** and **decorrelated** linear combination

**Advantages:**

- Define according to **Fisher projected** covariance matrix – no *a posteriori* bias in looking for features
- **Efficient** – can keep only **observable modes** and never requires MCMC over large correlated discrete space
- **Complete** – can include as many modes as required to make basis observationally complete
- **Paradigm testing** – rapidly explore all possible observational outcome of a given paradigm
- **Falsifiable predictions** for other observables not yet measured