# Thesis

# Plan

- Introduction
- Theory
- Collider
- Detector
- PFA
- PID
- Tau

# Introduction

- SM agrees with experimental observations.
- But still problem
- 1% precision needed
- Future ee collider
- lepton ID and Tau is important in Higgs precise measurement

# Theory

- SM: bosons and fermions
- Lagrangian for non zero vacuum
- EM symmetry breaking
- Higgs mechanism:
    - mass of boson/fermion
    - Higgs coupling (boson fermion)
- BSM:
    - Problems
    - precise measurement of the Higgs boson

# Collider

- Intro:
  - LHC worked well but not enough
  - ee collider can achieve the precision
    - advantage of Linear/Circular
- ILC/CEPC:
  - Physics processes
  - design

# Detector

- PFA to meet the requirement
- HGCAL for PFA
- Detector design

# PFA+ Optimazation

- PFAs
  - JER: definition/requirement
  - Pandora/Arbor: Steps
    - Performance: Separation+ BMR
- Opti
  - Ecal layer
  - Hcal layer and B field

# PID

- Importance
- Sample and how to express the performance (MM)
- Variables and TMVA weights
- Single particle:
    - eff+pur (energy range + detector position)
    - different geometry
- eeH/mmH:
    - importance (en spectrum)
    - eff + pur @ different geometry
    - eff + pur @ different energy range

# tau

- Intro
  - importances: higgs measurement
  - tau general information
- Steps: preselection+tau tagging
- lepton channel
  - preselection
  - tau finding steps: variables+tmva
  - cut chain
  - impact parameter
  - accuracy
- qq channel
  - preselection
  - tau finding steps
  - di-tau + di jet info
  - cut chain
  - impact parameter
  - accuracy
- Combine; Extrapolation

# conclusion