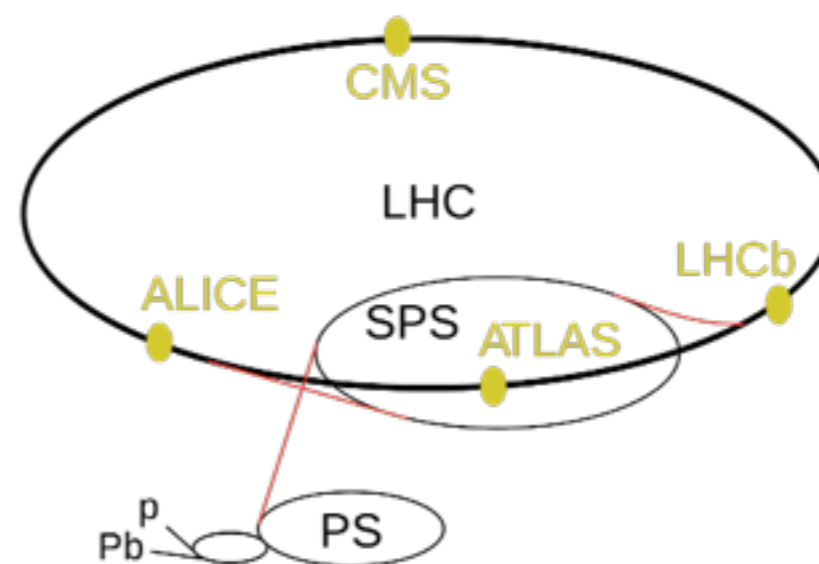


ABOUT ME

History

- Ph.D. at Berkeley with Nomura ('10)
- Postdoc at U Maryland and Johns Hopkins ('10-'13)
- CERN since Oct '13

Research interests:



LHC physics

AdS/CFT



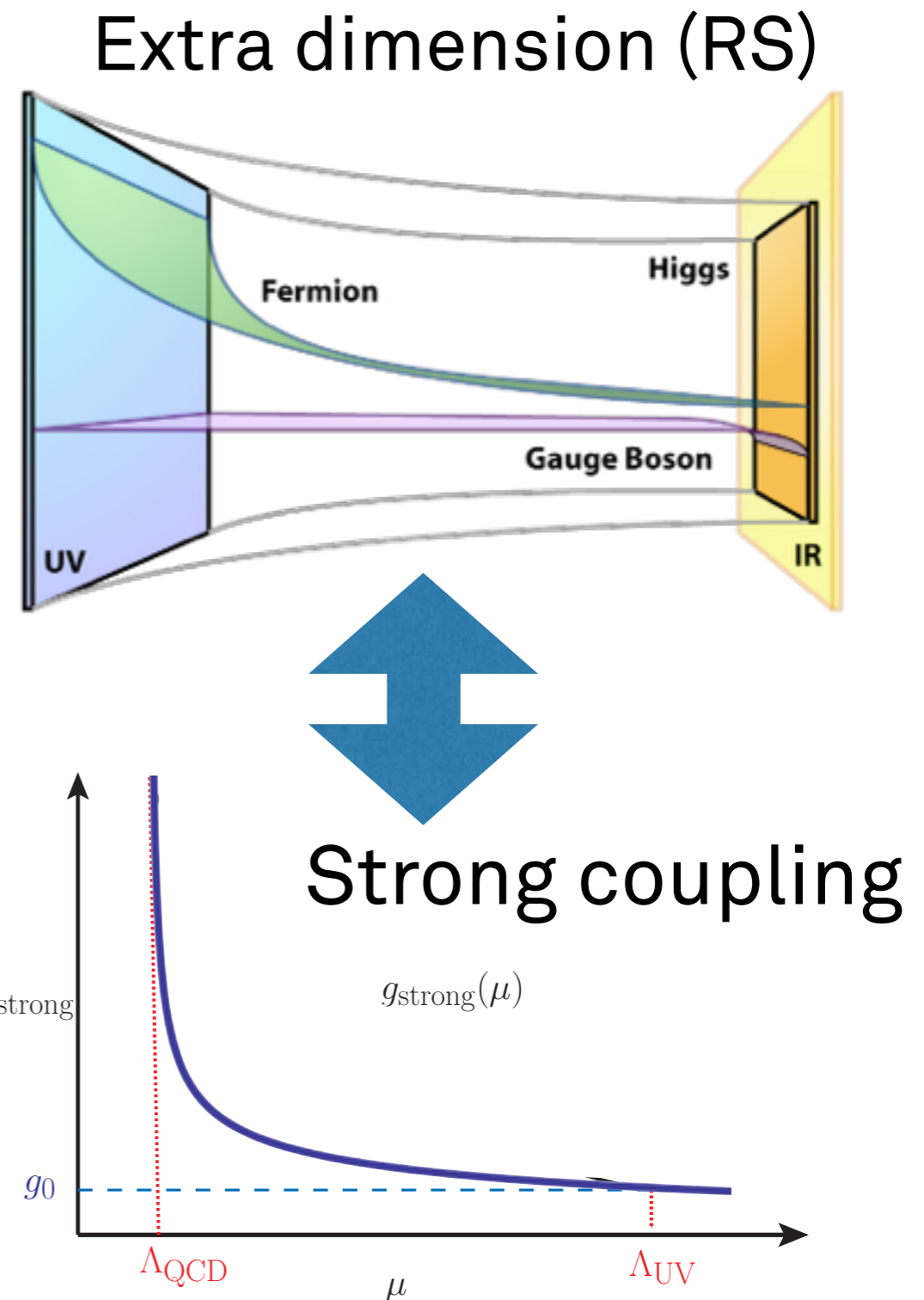
Dark matter

RADION/DILATON

Radion is excitation of size of extra dimension

Dual to dilaton, NGB of spont. conformal sym. breaking

Need to give radion mass, typically thought to be light



MODIFICATION OF PHENO

Goldberger Wise mechanism

$$V(\Phi) \sim m^2 \Phi^2 + \eta \Phi^3 + \dots$$

$$m^2 \Leftrightarrow \Delta(\Delta - 4)$$

Small m needed for large extra dimension, implies light radion

MODIFICATION OF PHENO

Goldberger Wise mechanism

$$V(\Phi) \sim m^2 \Phi^2 + \eta \Phi^3 + \dots$$

$$m^2 \Leftrightarrow \Delta(\Delta - 4)$$

Small m needed for large extra dimension, implies light radion

$$\eta \Leftrightarrow \text{interactions}$$

GW field is large at breaking scale, interactions become important and mean light radion is **not** generic.

Chacko, Mishra, DS, '13.

MODIFICATION OF PHENO

Radion/dilaton coupling related to scaling dimension

$$\Delta_\psi = \left| c_\psi \pm \frac{1}{2} \right| + \frac{3}{2}$$

GW corrections to couplings imply:

$$\Delta_\psi = \left| c_\psi (1 + a \Phi(\pi)) \pm \frac{1}{2} \right| + \frac{3}{2} + \mathcal{O}(m_\varphi^2)$$

MODIFICATION OF PHENO

Radion/dilaton coupling related to scaling dimension

$$\Delta_{\psi} = \left| c_{\psi} \pm \frac{1}{2} \right| + \frac{3}{2}$$

GW corrections to couplings imply:

$$\Delta_{\psi} = \left| c_{\psi} (1 + a \Phi(\pi)) \pm \frac{1}{2} \right| + \frac{3}{2} + \mathcal{O}(m_{\varphi}^2)$$

Chacko, Misra, DS, Verhaaren, '14?

MODIFICATION OF PHENO

Radion/dilaton coupling related to scaling dimension

$$\Delta_\psi = \left| c_\psi \pm \frac{1}{2} \right| + \frac{3}{2}$$

GW corrections to couplings imply:

$$\Delta_\psi = \left| c_\psi (1 + a \Phi(\pi)) \pm \frac{1}{2} \right| + \frac{3}{2} + \mathcal{O}(m_\varphi^2)$$

Vanishes in
conformal limit



Chacko, Misra, DS, Verhaaren, '14?

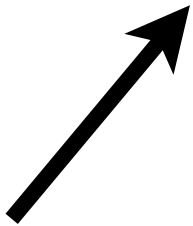
MODIFICATION OF PHENO

Radion/dilaton coupling related to scaling dimension

$$\Delta_\psi = \left| c_\psi \pm \frac{1}{2} \right| + \frac{3}{2}$$

GW corrections to couplings imply:

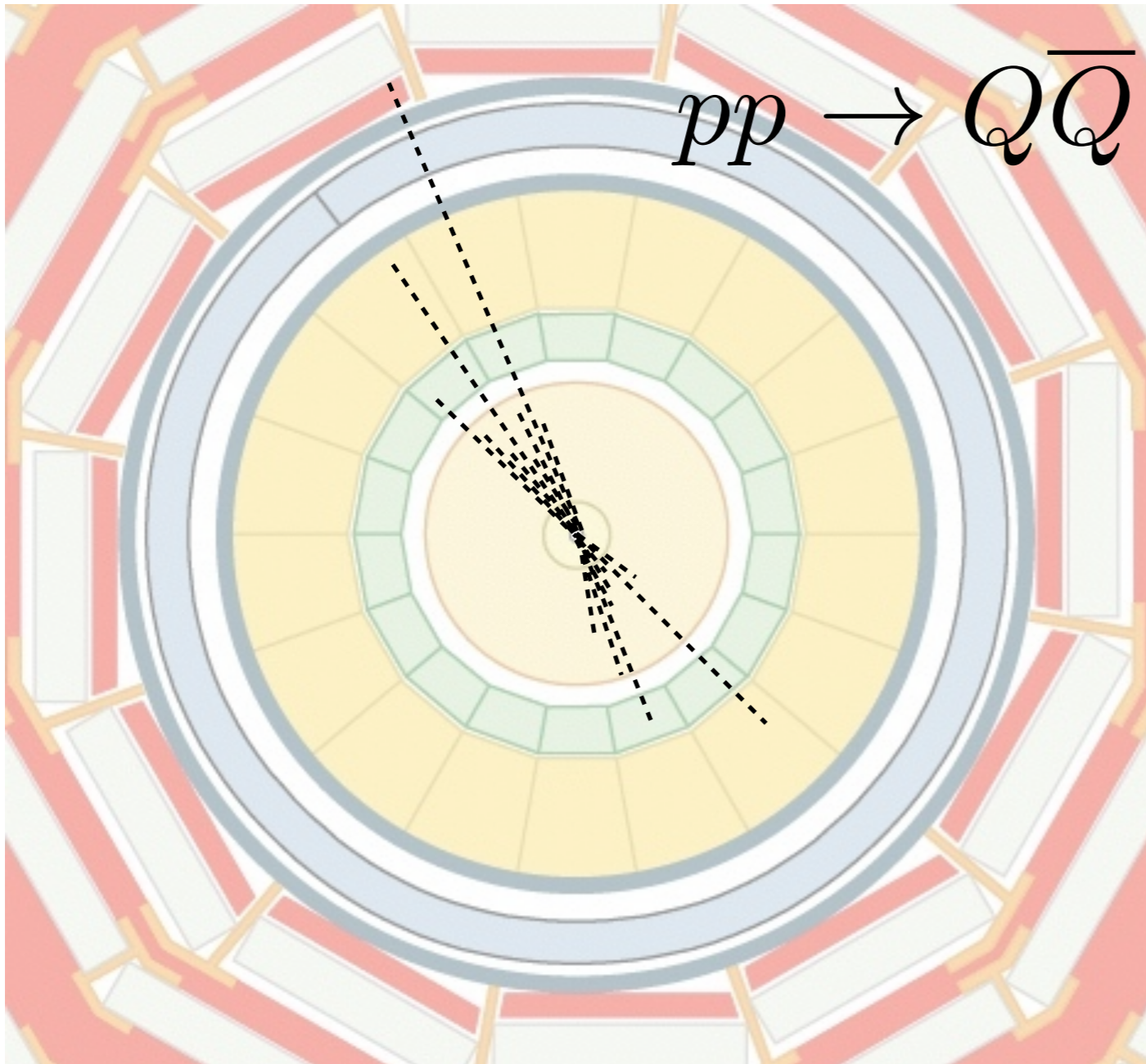
$$\Delta_\psi = \left| c_\psi (1 + a \Phi(\pi)) \pm \frac{1}{2} \right| + \frac{3}{2} + \mathcal{O}(m_\varphi^2)$$

 c changes with scale, have to evaluate dictionary at breaking scale

 Vanishes in conformal limit

Chacko, Misra, DS, Verhaaren, '14?

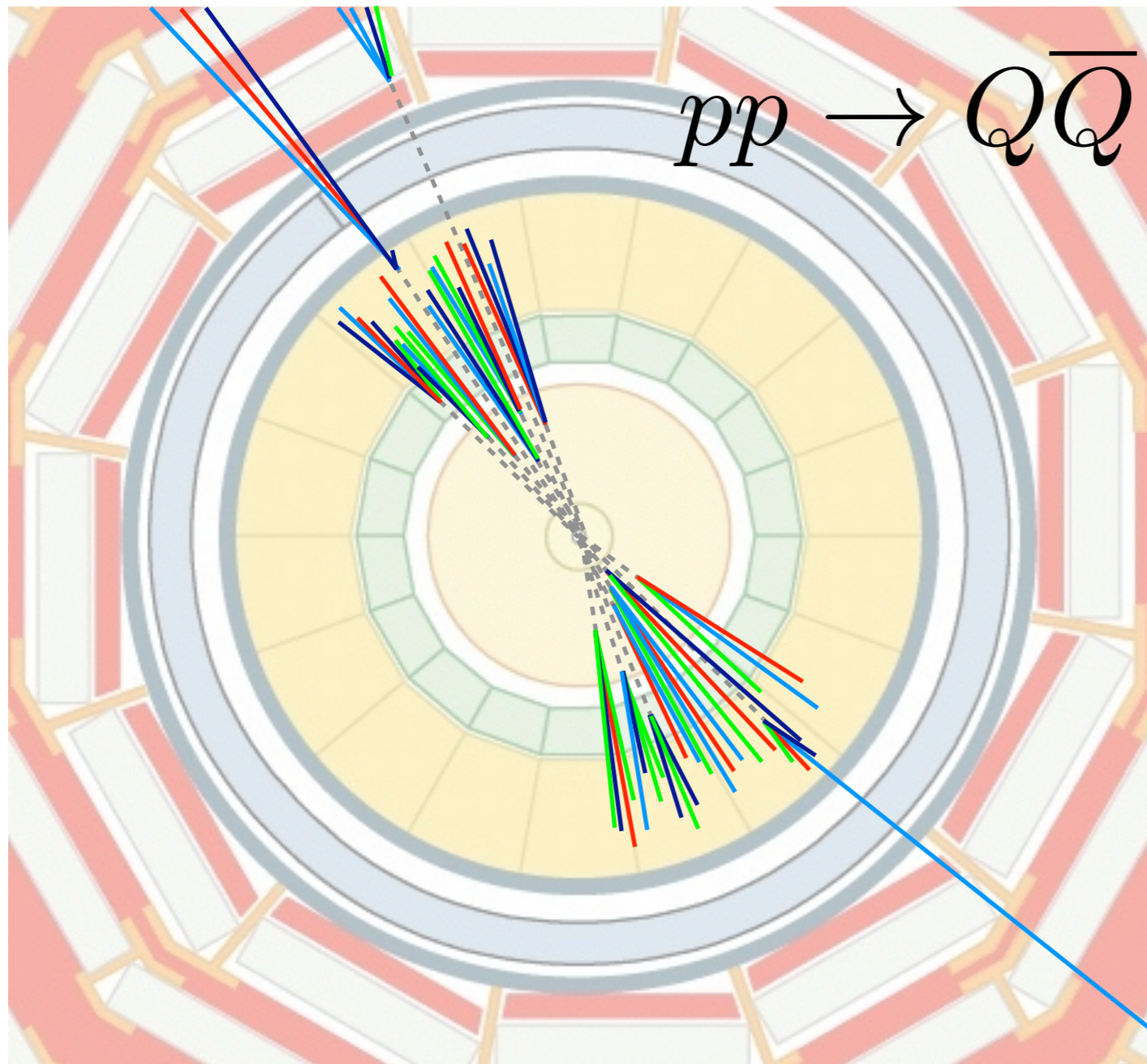
EMERGING JETS



QCD like dark sector

Heavy mediator
produced at LHC

EMERGING JETS

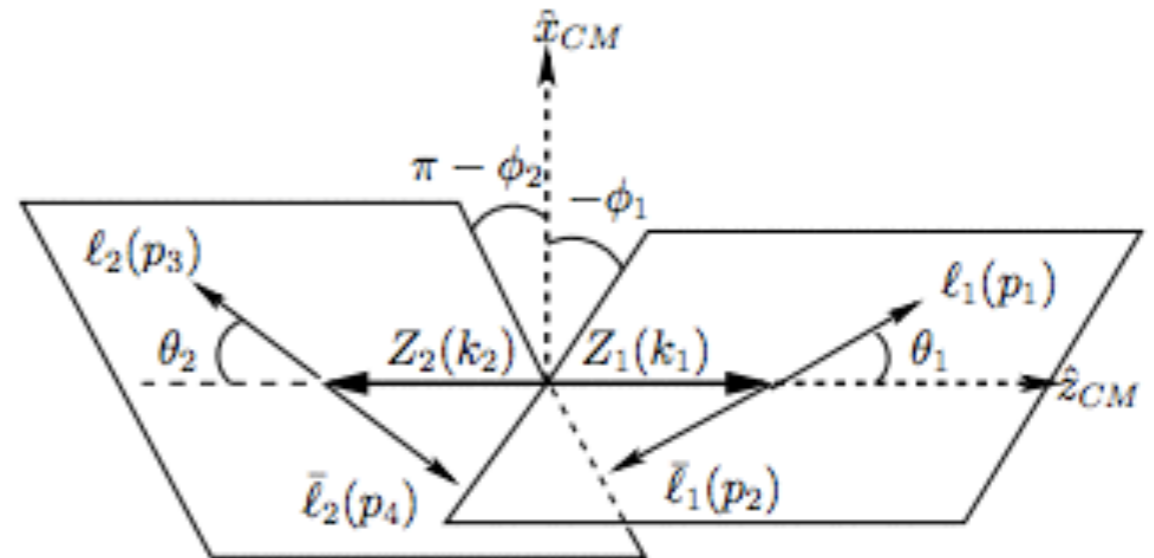
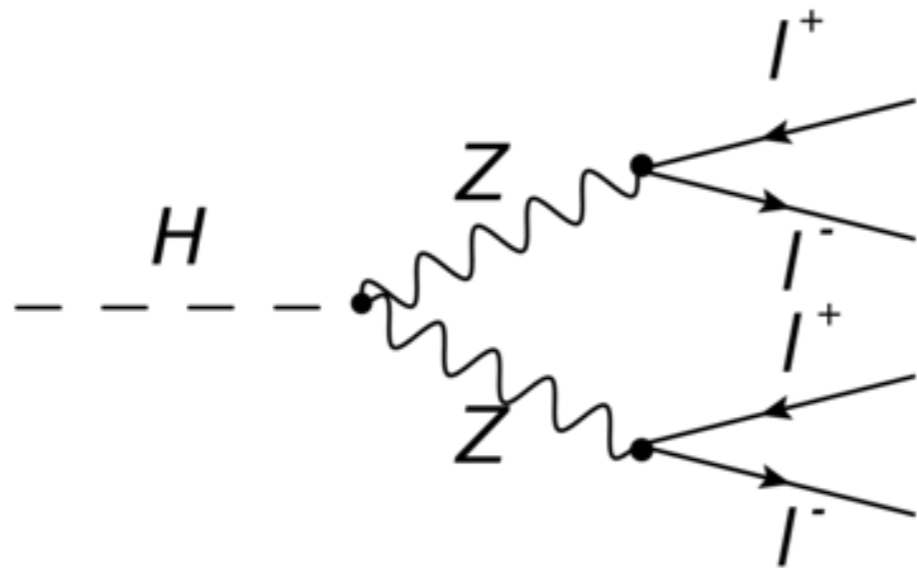


Dark pions decay, novel
and distinct signature

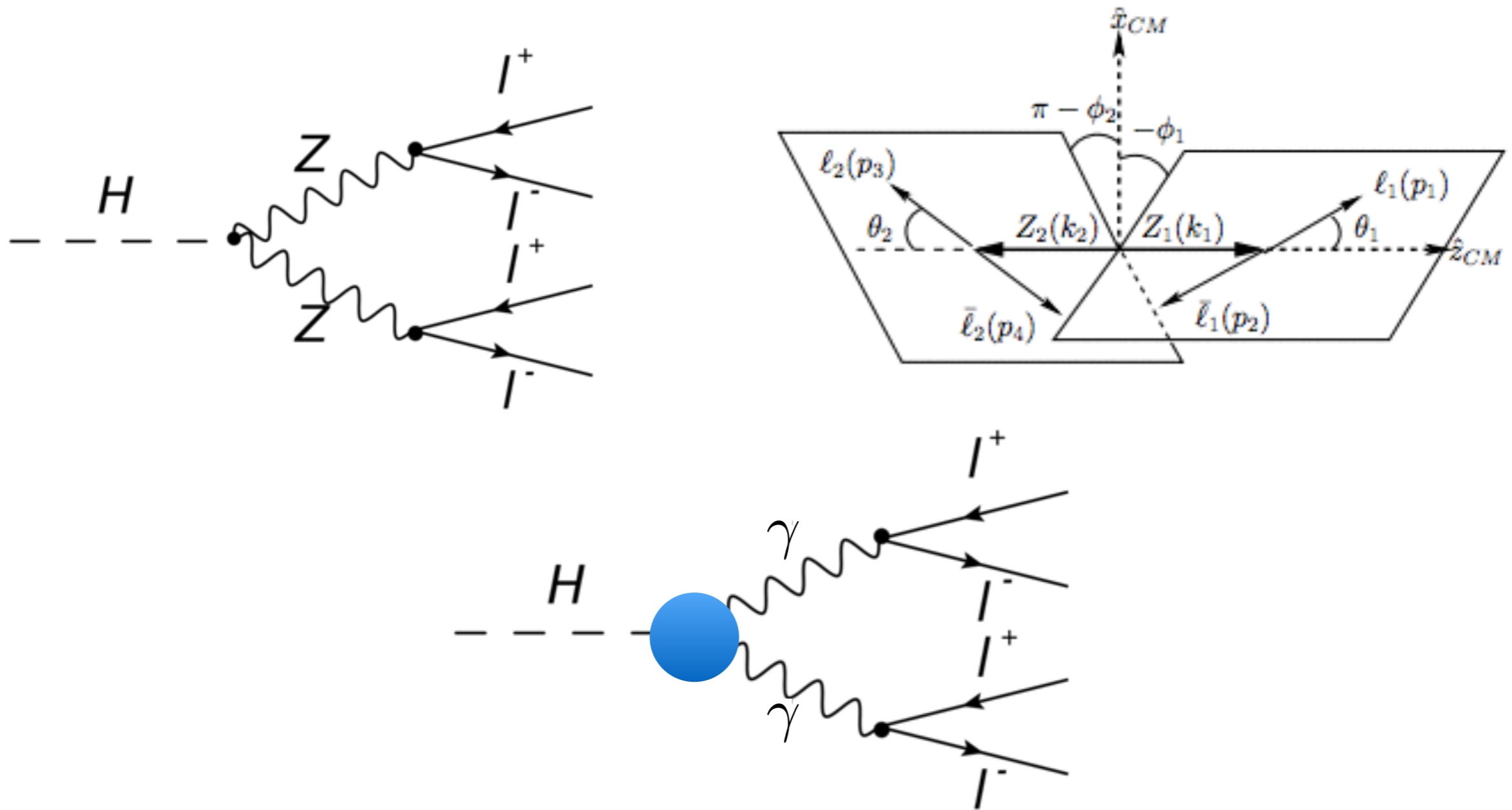
CMS and ATLAS
investigating, LHCb?

Paper to appear with
Andi and Pedro

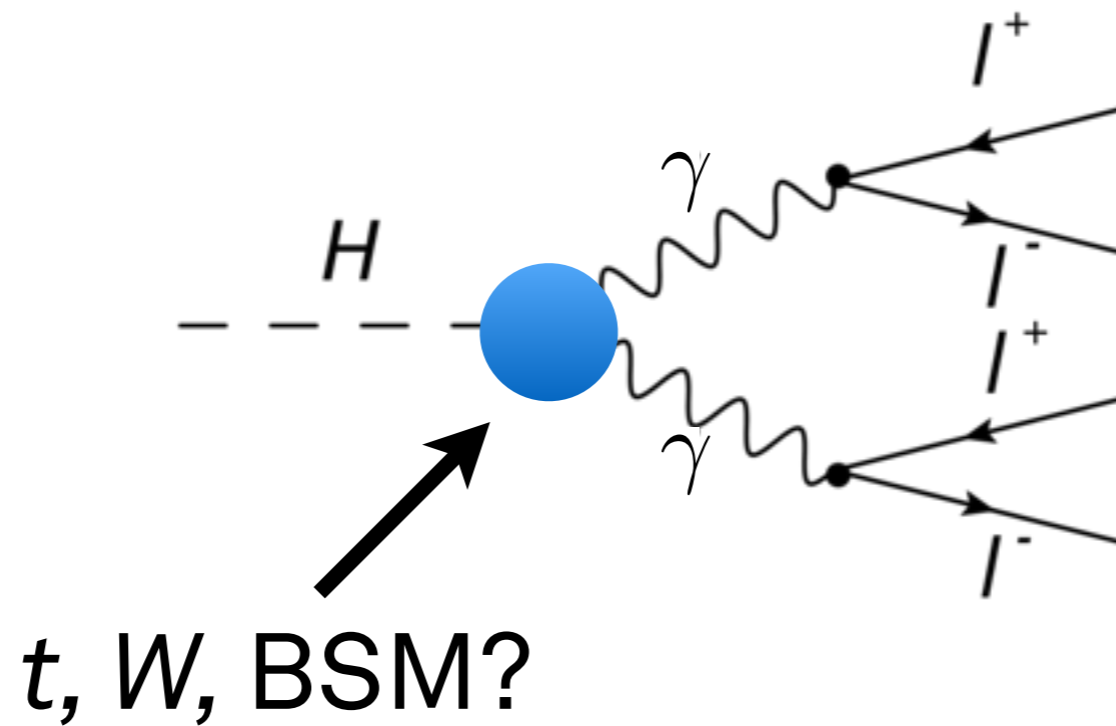
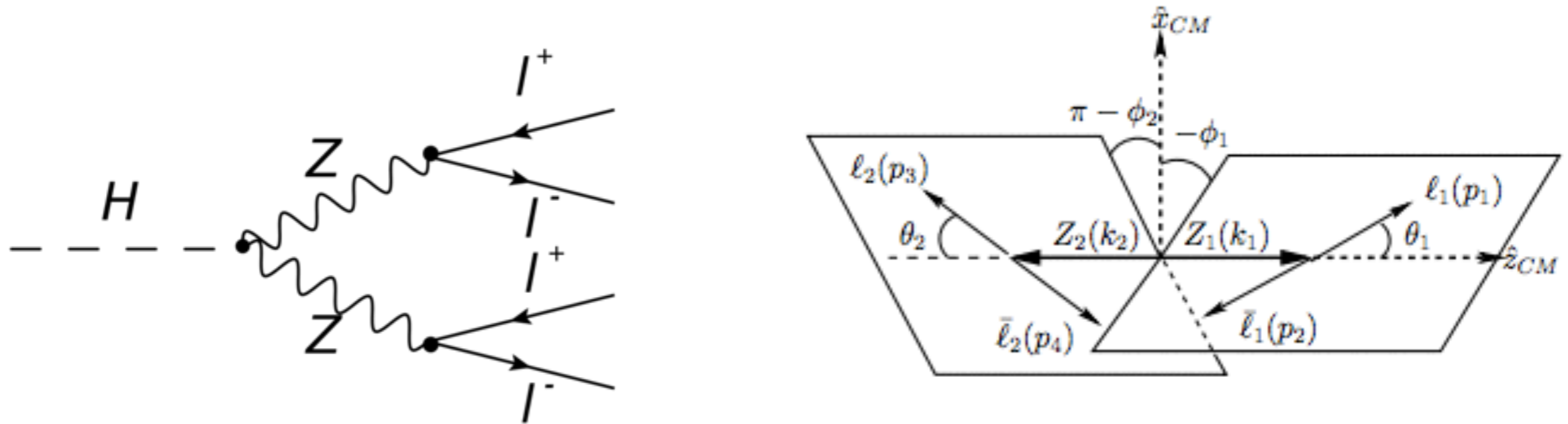
HIGGS TO 4 LEPTONS



HIGGS TO 4 LEPTONS



HIGGS TO 4 LEPTONS



FUTURE DIRECTIONS

- Running of α_3 at 100 TeV
- Flavor violation in LH squarks
- Dark matter EFT at colliders
- Spin correlations in tth
- Lights stops and Higgs data

**THANK
YOU**