

### Happy Birthday, Howie

S. Dawson, BNL Feb. 2022

### l've known Howie since 1983

- I was a post-doc at LBL
- I was doing SM Higgs physics..... Howie was perfecting his 2HDM and MSSM expertise
  - He went out of his way to support a young post-doc
- We collaborated on one of my top papers
  - My first refereed paper with Howie
  - Are light Higgs Bosons allowed? 1 citation
- Definitely, I needed to do better



\* Note it's a 2HDM Feynman diagram

# Higgs Hunters Guide is born

Around 1987, we started thinking about writing a review of Higgs physics

#### We each had our own vision

- Howie: "We gotta put in the 2HDM Feynman rules"
- Me: "Nobody's going to look at them"
- Repeat conversation over and over (Howie was definitely right)
- Me: "We need the low energy limits from  $\pi$  and K decays"
- Howie: "Some of that theory is a little iffy" (Howie right again)

Higgs Hunters Guide had new physics • 2HDM, MSSM, Higgs singlets (STILL) our favorite models to compare the SM with

- 50 pages of Feynman rules
- CP violation in the Higgs sector
- More scalars: Higgs triplets, left-right symmetric models

### 2010 @ U Michigan

Anxiously waiting for the Higgs (20 years after the Higgs Hunter's Guide)







#### 2016 at Higgs Couplings @SLAC

- Is it the Higgs?
- Still room for new physics in Higgs sector
- At this point, we were just beginning to explore the Higgs couplings to top and bottom

# 2022: Higgs couplings close to SM



- Couplings proportional to mass
- A deviation from this pattern signals new physics
- What are the possibilities?

S. Dawson

Howie changed the way we look at BSN

Serious, serious studies of Beyond the Standard Model possibilities

No more handwaving....you have to do it right

I think Howie deserves a huge amount of credit for encouraging the community to study new models in a serious fashion

### Decoupling

- The Higgs looks very much SM like
- New physics needs to decouple at high scales
- Howie: CP conserving 2HDM model
- This ground breaking study paved the way for understanding how the low energy limit of a UV model approaches the SM
- This led directly to modern SMEFT studies of new physics

The CP-conserving two Higgs doublet model: the approach to the decoupling limit (2002) arXiv:0207010



## The future ?

### Or this?



S. Dawson, BNL

# Best of luck in the coming years

I hope you get a nice birthday present

