EXPANSION OF TRACK-BASED TRIGGERS FOR HL-LHC

CMS

L1 TRACKS potential to add displaced tracks

ATLAS

1 MHZ TRACKS with displaced tracks included in the baseline
EXPANSION OF TRACK-BASED TRIGGERS FOR HL-LHC

**CMS**

- **L1 TRACKS**: Potential to add displaced tracks
- **extended HLT tracking**

**ATLAS**

- **1 MHZ TRACKS**: With displaced tracks included in the baseline
- **extended HLT tracking**
EVERY UNCONVENTIONAL SIGNATURE IS DIFFERENT
EVERY UNCONVENTIONAL SIGNATURE IS DIFFERENT
IDENTIFICATION IN THE TRIGGER

Y. Gershtein

ATLAS Collaboration

Using 30% of the FTK patterns for long-lived particles

Dr. Tova Holmes, University of Tennessee
HOW TO MAXIMIZE FLEXIBILITY?
SUEPS

DISTINCTIVE SIGNATURE: HIGH TRACK MULTIPLICITY

Dr. Tova Holmes, University of Tennessee
Dr. Tova Holmes, University of Tennessee

MOST IMPORTANT: AS LOW A PT THRESHOLD AS POSSIBLE
HIGGS PORTAL

DISTINCTIVE SIGNATURE: DISPLACED VERTICES

ACCEPTANCE: 5 DISPLACED TRACKS
Higgs Portal

MOST IMPORTANT: LOW PT THRESHOLD WITH NON-ZERO DISPLACEMENT RANGE
HIGGS PORTAL

MOST IMPORTANT: LOW PT THRESHOLD WITH NON-ZERO DISPLACEMENT RANGE

EFFICIENCY DUE TO INCREASING PT THRESHOLDS
LONG-LIVED STAU

\[ p \overset{\tau}{\longrightarrow} \tilde{\tau} \quad \tilde{\tau} \overset{\tilde{G}}{\longrightarrow} \tilde{\tau} \]

DISTINCTIVE SIGNATURES

DISPLACED LEPTON

lifetimes < 1 ns

NON-SM TRACK

lifetimes > 1 ns
LONG-LIVED STAU

NON-SM TRACK

DISTINCTIVE SIGNATURES

much more in our paper!
LONG-LIVED STAU

DISTINCTIVE SIGNATURES

DISPLACED LEPTON
LONG-LIVED STAU

MOST IMPORTANT: LARGE DISPLACEMENT RANGE
The TRENDS diagram from Dr. Tova Holmes, University of Tennessee, illustrates the sensitivity of three categories: SUEP, LOW-MASS/HADRONEC LLP, and HIGH-MASS/LEPTONIC LLP. The sensitivity levels are categorized as HIGH, MEDIUM, and LOW. In the SUEP category, the sensitivity is HIGH. In the LOW-MASS/HADRONEC LLP category, the sensitivity is MEDIUM. In the HIGH-MASS/LEPTONIC LLP category, the sensitivity is HIGH.
CONCLUSIONS

POSSIBLE TO COVER A WIDE RANGE OF SIGNATURES AND OPEN NEW PATHS FOR ANALYSIS!
THANK YOU!