



LABORATORY FOR ELEMENTARY-PARTICLE PHYSICS

# LEPP Joint Seminar



## Emilie Passemar

### Indiana

### Determination of $V_{us}$ and status of the first-row CKM unitarity

Testing the unitarity of the Cabibbo-Kobayashi-Maskawa (CKM) matrix has long been recognized as a powerful probe of physics beyond the Standard Model.

In this talk, we will focus on the unitarity of the first row and review the determination of the CKM matrix element  $|V_{us}|$ . We will show how recent experimental and theoretical advances in kaon physics and in hadronic tau decays have allowed to reach a new level of precision on  $|V_{us}|$ . All these analyses rely on precise calculations of the hadronic quantities involved (form factors, decay constants, correlators, etc.).

We will discuss recent advances in these calculations as well as the new experimental results, review the remaining discrepancies and survey the prospects offered by the forthcoming measurements at flavour factories.

Finally, we will discuss the recent 3-4 sigma tension that has emerged in the top-row unitarity test combining new theoretical calculations of the radiative corrections to nuclear beta decays to determine  $|V_{ud}|$  and the  $|V_{us}|$  extraction.

**Friday, September 6, 2019**

**1:00pm**

**401 Physical Sciences Bldg.**