



# PPD Seminar

## Unitarity triangle angles explained: a predictive new quark mass matrix texture

**Paul Harrison (Warwick)**

**13 May 2026, 11:30**

**R61 CR03 (RAL)**

We propose a novel quark mass matrix texture pair with five free parameters, which fits the four quark mass ratios  $m_s/m_b$ ,  $m_d/m_b$ ,  $m_c/m_t$ ,  $m_u/m_t$ , and the four CKM quark mixing observables. The matrices each have one zero texture, but the main innovation here is a “geometric” ansatz that exploits a pair of small complex expansion parameters, based on the geometry of the Unitarity Triangle. The fit to the observables is in good agreement with current experimental values renormalised to  $\sim 10^4$  TeV, and offers decisive tests against future high-precision measurements of the unitarity triangle angles at the weak scale. We identify two novel symmetries of these mass matrices, which explain the phenomenologically-successful relations  $\alpha \equiv \phi_2 \sim \pi/2$  and  $\beta \equiv \phi_1 \sim \pi/8$ .

