

V_{ub} from exclusive semileptonic B decays

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1. Introduction

- only $B \rightarrow \pi$, translation to $B \rightarrow \rho$ trivial

- $$\mathcal{A} = -i \frac{G_F}{\sqrt{2}} V_{ub} \mathcal{L}^\mu \mathcal{H}_\mu$$

- $$\mathcal{H}_\mu \equiv \langle \pi(p') | \bar{u} \gamma_\mu b | B(p) \rangle$$

Most useful parametrization:

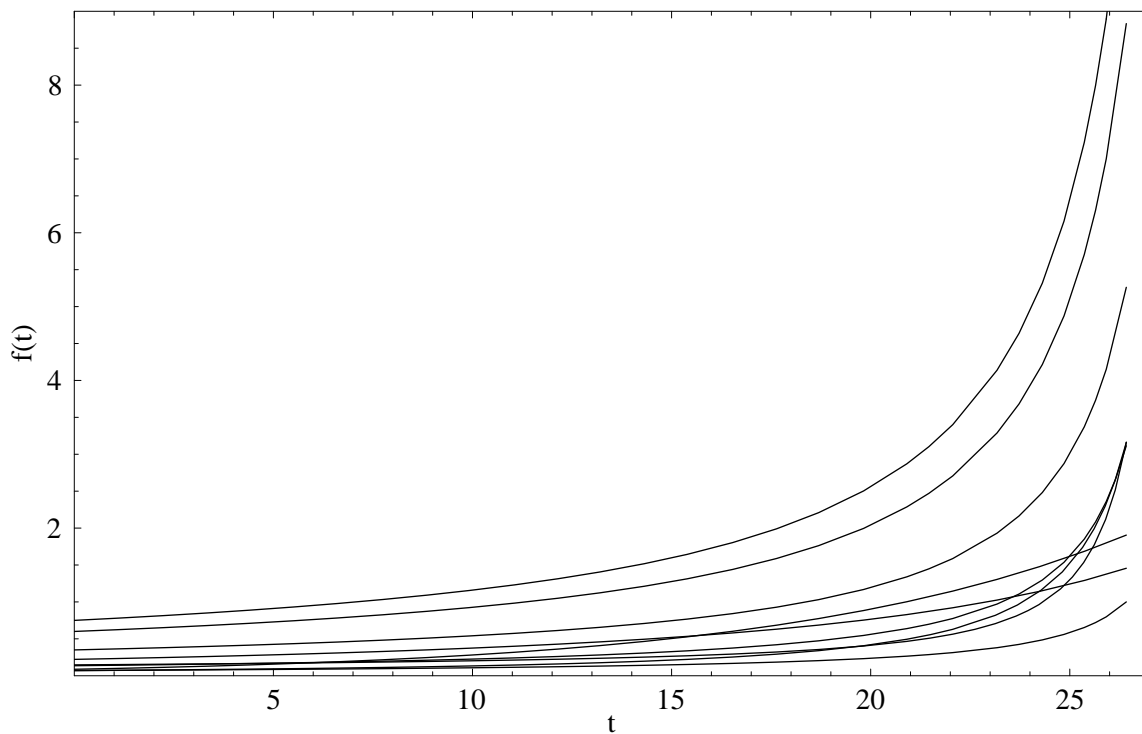
$$\begin{aligned} \mathcal{H}_\mu &\equiv \left(p_\mu + p'_\mu - \frac{M_B^2 - m_\pi^2}{q^2} q_\mu \right) f^+(q^2) \\ &+ \frac{M_B^2 - m_\pi^2}{q^2} q_\mu f^0(q^2) \end{aligned}$$

with $q \equiv p - p'$

- $\mathcal{L}^\mu q_\mu = 0$ for massless leptons
- $f^+(0) = f^0(0)$

2. Models

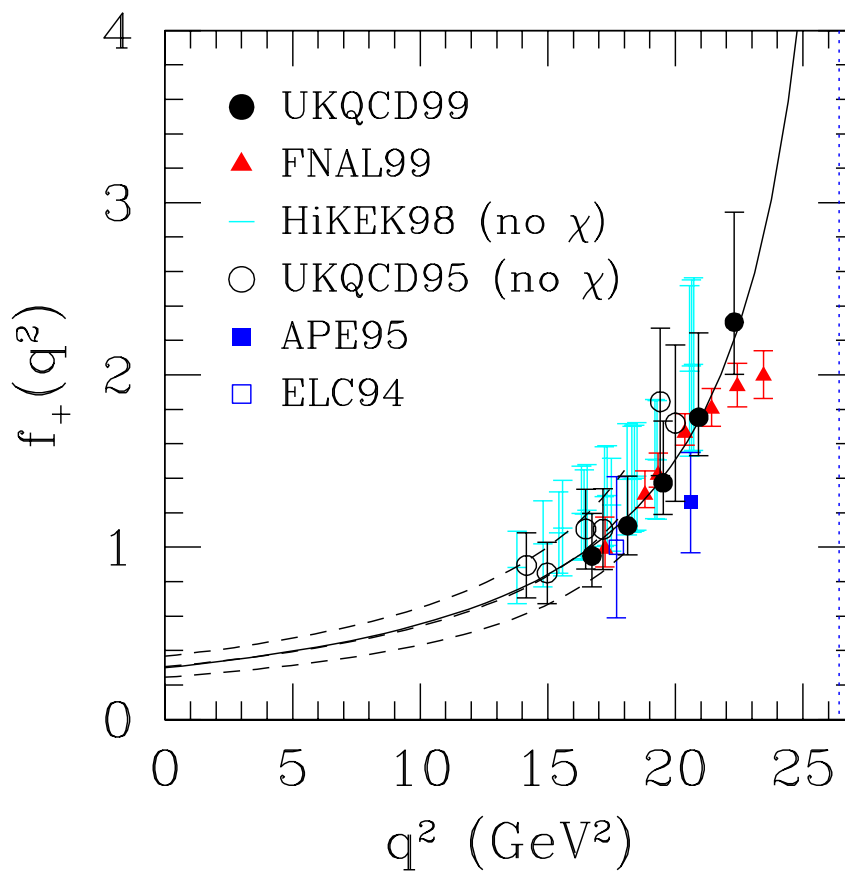
- MANY models
- theoretical uncertainties?!?
- test one model with another one



9 models for f^+

3. Lattice

- heavy quarks and fast pions
- only points
- most collaborations use models to extrapolate



4. Unitarity Bounds

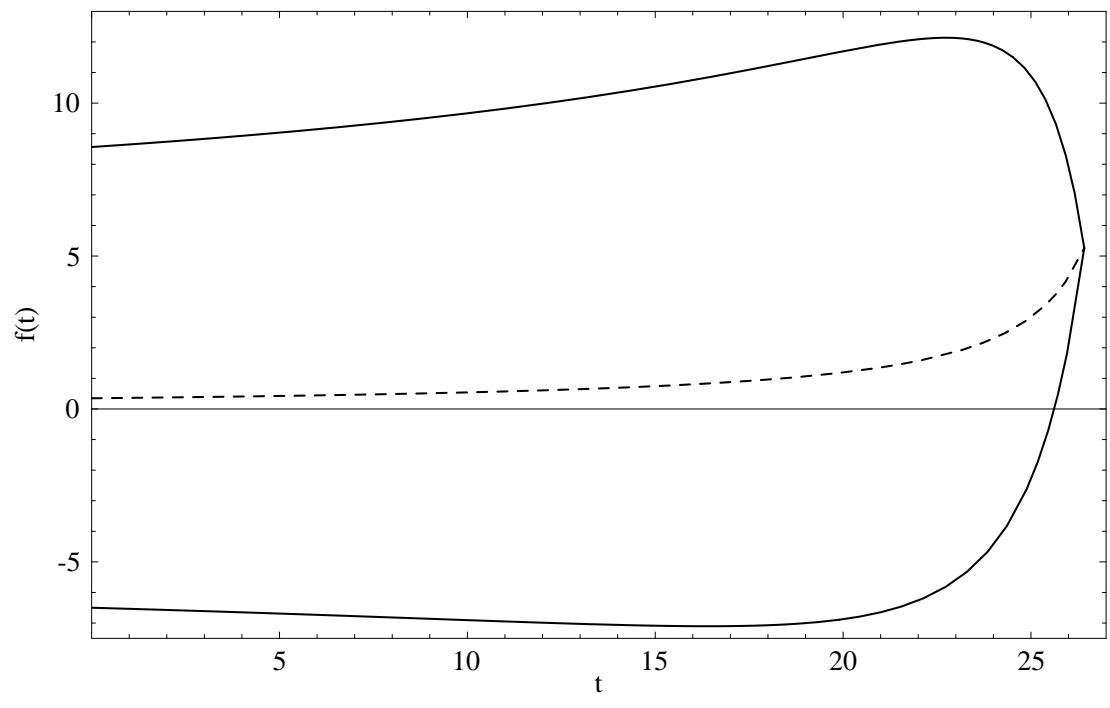
Ingredients:

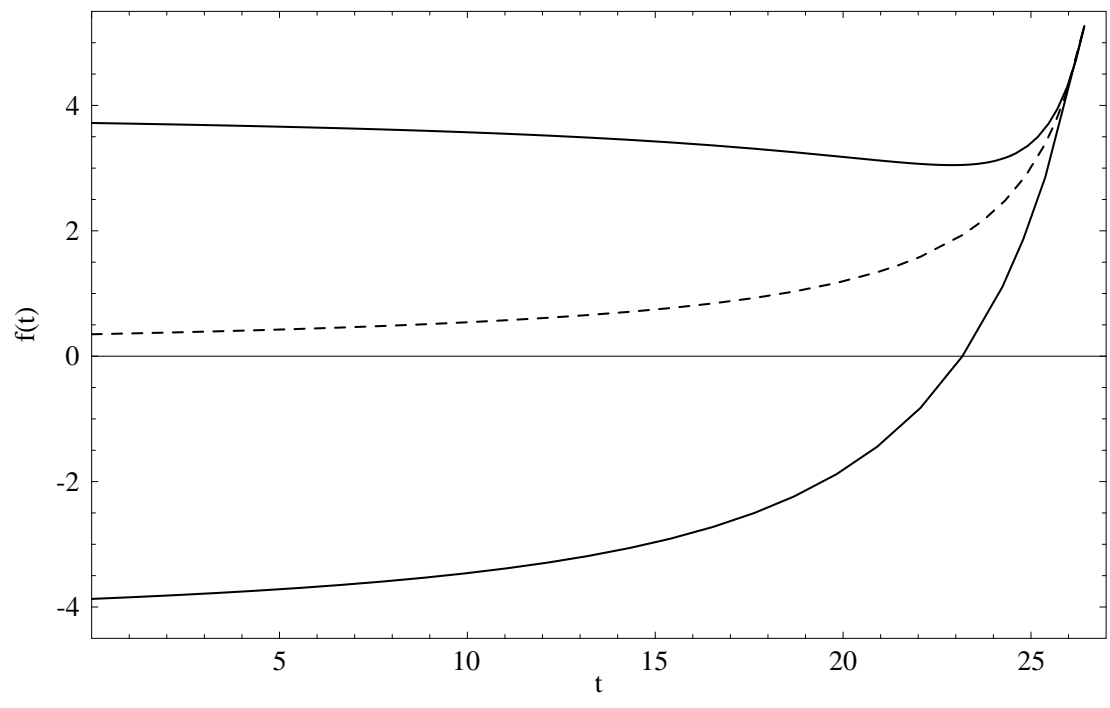
- QCD calculation + quark/gluon condensates
- dispersion relations
- crossing and isospin symmetries

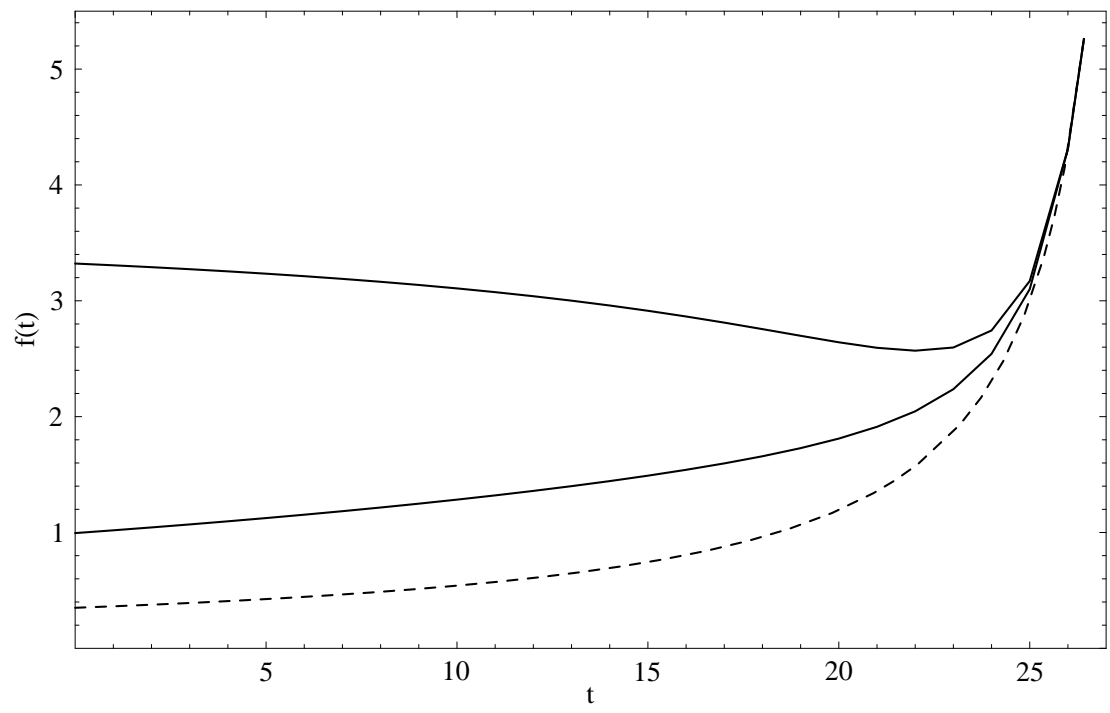
Problems:

- needs additional input, otherwise useless
- knowledge of points and derivatives can be easily added

Movie: [BSW model and the Unitarity Bounds](#)







5. Summary

- aim: model independent extraction of V_{ub}
- can not be done without Lattice

personal opinions

- most promising: combination of Lattice and Unitarity Bounds
- exclusive method is competitive with inclusive method