

# THE PHYSICS COLLOQUIUM

Thursday 21 November 2024, 4:00 p.m.  
Nijenborgh 4, Lecture Hall 5111.0080

## Testing the Standard Model with the help of St. Benedict at Notre Dame

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Nuclear beta decays provide a unique avenue for testing the weak interaction part of the Standard Model (SM) through precision measurements. One probing mechanism for new physics is the unitarity test of the Cabibbo-Kobayashi-Maskawa quark mixing matrix, which relates the regular mass Eigenstates of the quarks with the ones under the weak interaction. Up to until recently the SM-predicted unitarity was fulfilled.

However, recent radiative correction calculation results, used for the determination of the biggest matrix element,  $V_{ud}$ , now generates a three standards deviation with unitarity, leading to renewed interest on the experimental and theoretical fronts. As such, in the past few years, a research program aimed at solidifying the determination of  $V_{ud}$  from superallowed beta-decay transitions between mirror nuclei was initiated using radioactive ion beams from the Twin Solenoid (TwinSol) separator at the Nuclear Science Laboratory of the University of Notre Dame.

The first part of the program is centered on precision half-life measurements and the second part aims at measuring the beta-neutrino angular correlation parameter  $a_{\beta\nu}$ . Recent half-life measurements and the current development status of the St.Benedict ion trapping system that will measure  $a_{\beta\nu}$  in many transitions between mirror nuclei for the first time will be presented.



*Join us for coffee starting 3:30 p.m. Refreshments will be served after the lecture.*

For more information contact the host: Julia Even ([j.even@rug.nl](mailto:j.even@rug.nl))  
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