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Novel Relationships between Superoscillations, Weak Values, and Modular Variables JEFF TOLLAKSEN, Center for Quantum Studies, Department of Physics and Department of Computational and Data Sciences, College of Science, George Mason University — We present several novel, unexpected relationships between superoscillations, weak values and modular variables. For example, we show how an uncertain phase, which characterizes the process of projecting a particle onto a superoscillatory region, can create the high-momentum. If an uncertain phase can localize the particle, then a definite phase can also localize it. This introduction of a relative phase corresponds to a non-local exchange of modular variables. We also present a new way to measure the nonlocality in the equation of motion for modular variables by using weak measurements.

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