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Accessible non-linear witnesses NORBERT LÜTKENHAUS, OLEG GITTSOVICH, JUAN MIGUEL ARRAZOLA, Institute for Quantum Computing, Department of Physics and Astronomy, University of Waterloo — Verification of entanglement is an important tool to characterize sources and devices for use in quantum computing and communication applications. Evaluation of entanglement witnesses are an especially valuable tool, especially for higher-dimensional systems, as they do not require a full reconstruction of the underlying quantum state (tomography). Linear witnesses can be extended to series of non-linear witnesses [1, 2] so that each element of this family detects a strictly larger set of entangled states than the previous one. In our contribution we show that one can construct series of *accessible* non-linear witnesses that can be evaluated using exactly the same data as for the evaluation of the original linear witness. This allows a reanalysis of published experimental data to strengthen statements about entanglement verification without the requirement to perform additional measurements. Accessible non-linear witnesses allow the verification of entanglement without critical dependence on having found the "right" linear witness. They can also enhance the statistical significance of the entanglement verification.

[1] O. Gühne and N. Lütkenhaus, PRL 96, 170502 (2006)
[2] T. Moroder, O. Gühne, and N. Lütkenhaus, PRA 78, 032326 (2008)

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