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*Classification of Spacetimes with Symmetry*. Preliminary report.

Spacetimes with symmetry play a critical role in Einstein's Theory of General Relativity. Missing from the literature is a correct, usable, and computer accessible classification of such spacetimes. This research fills this gap; specifically, we

- i) give a new and different approach to the classification of spacetimes with symmetry using modern methods and tools such as the Schmidt method and computer algebra systems, resulting in ninety-two spacetimes;
- ii) create digital databases of the classification for easy access and use for researchers;
- iii) create software to classify any spacetime metric with symmetry against the new database;
- iv) compare results of our classification with those of Petrov and find that Petrov missed six cases and incorrectly normalized a significant number of metrics;
- v) classify spacetimes with symmetry in the book *Exact Solutions to Einstein's Field Equations Second Edition* by Stephani, Kramer, Macallum, Hoenselaers, and Herlt and in Komrakov's paper *Einstein-Maxwell equation on four-dimensional homogeneous spaces* using the new software.

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