Einstein Metrics in Abundance

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In 1987 in the well-known book, Einstein Manifolds by A. Besse, it was asked whether Einstein metrics were few in number or many. Using both contact geometry (Sasakian) and algebraic geometry we (in collaboration with K. Galicki, J. Kollár, M. Nakamaye, and others) have shown that Einstein metrics occur in profusion. In particular, on odd dimensional spheres both the number of deformation classes of Sasaki-Einstein metrics as well as the number of moduli grow double exponentially with dimension. This includes exotic spheres which a bound parallelizable manifold. It is also shown that Sasaki-Einstein metrics occur on (infinitely) many simply connected 5-manifolds. I will sketch the method of proof of these results and others.