A dichotomy for some elementarily generated modal logics

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In this talk we consider the normal modal logics of elementary classes defined by first-order formulas of the form $\forall x_0 \exists x_1 \cdots \exists x_n \left(\bigwedge x_i R_\lambda x_j \right)$. We prove that many properties of these logics, such as finite axiomatisability, elementarity, axiomatisability by a set of canonical formulas or by a single generalised Sahlqvist formula, together with modal definability of the initial formula, either simultaneously hold or simultaneously do not hold. We also present a simple graph-theoretic criterion for deciding which of these cases takes place. This criterion is related to the joint work with Evgeny Zolin about answering modally definable conjunctive queries in description logics. The proof of the dichotomy uses probabilistic graphs of I. Hodkinson and Y. Venema.