

## Refutation complexity of relativized spectra.

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Given a first-order sentence  $\phi$  and a positive natural number  $n$  it is straightforward to write down a propositional formula  $\langle\phi\rangle_n$  in CNF that is satisfiable if and only if  $\phi$  has a model of cardinality  $n$ . In particular,  $\langle\phi\rangle_n$  is unsatisfiable if and only if  $n$  does not belong to the spectrum of  $\phi$ .

We are interested in the refutation complexity of the formulas  $\langle\phi\rangle_n$  for  $n \notin \text{spec}(\phi)$  - generally in arbitrary refutation systems and especially in Resolution based refutation systems.

Riis' Gap Theorem gives an exponential lower bound on the refutation sizes in treelike Resolution in case  $\phi$  has an infinite model. For relativized such sentences  $\phi^R$  Dantchev and Riis establish an exponential lower bound even in daglike Resolution (and treelike  $R(k)$  for each fixed  $k$ ). For a different translation into propositional logic we give an exponential lower bound in daglike  $R(k)$  (for each fixed  $k$ ).