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Symbiosis and Upwards Reflection Principles

Abstract. In [1], Bagaria and Väänänen developed a framework for studying the large cardinal strength of Löwenheim-Skolem theorems of strong logics using the notion of Symbiosis (originally introduced by Väänänen in his PhD Thesis). Symbiosis provides a way of relating model theoretic properties of strong logics to definability in set theory. We continue the systematic investigation of Symbiosis and apply it to upwards Löwenheim-Skolem theorems (and partially to compactness properties). As an application, we provide some upper and lower bounds of the large cardinal strength of upwards Löwenheim-Skolem-type theorems of second order logic. This is joint work with Lorenzo Galeotti and Jouko Väänänen.

[1] Joan Bagaria and Jouko Väänänen, “On the Symbiosis Between Model-Theoretic and Set-Theoretic Properties of Large Cardinals”, *Journal of Symbolic Logic* 81 (2) P. 584-604