ABSTRACT. In this paper I argue against Nancy Cartwright’s claim that we ought to abandon what she calls “fundamentalism” about the laws of nature and adopt instead her “dappled world” hypothesis. According to Cartwright we ought to abandon the notion that fundamental laws (even potentially) apply universally, instead we should consider the law-like statements of science to apply in highly qualified ways within narrow, non-overlapping and ontologically diverse domains, including the laws of fundamental physics. For Cartwright, “laws” are just locally applicable refinements of a more open-ended concept of capacities. By providing a critique of the dappled world approach’s central notion of open ended capacities and substituting this concept with an account of properties drawn from recent writing on the subject of structural realism I show that a form of fundamentalism is viable. I proceed from this conclusion to show that this form of fundamentalism provides a superior reading of case studies, such as the effective field theory program (EFT) in quantum field theory, than the “dappled world” view. The case study of the EFT program demonstrates that ontological variability between theoretical domains can be accounted for without altogether abandoning fundamentalism or adopting Cartwright’s more implausible theses.

1. INTRODUCTION

In this paper I argue against Nancy Cartwright’s claim that we ought to abandon what she calls “fundamentalism” about the laws of nature and adopt instead her “dappled world” hypothesis. According to Cartwright we ought to abandon the notion that fundamental laws (even potentially) apply universally. Instead we should consider the law-like statements of science to apply in highly qualified ways within narrow, non-overlapping and ontologically diverse domains.

I do not, however, take issue with her emphasis on the differing ontologies associated with the domains of different scientific theories. Instead I will show that when the concept of a property possessed by constituent of a theory is considered closely it
becomes clear that properties confer dispositions for law-like regularities i.e., structural equations that can apply across instances of theory change and also different domains. I make it clear that this is in keeping with a structural realist account of properties and that such a view implies a version of fundamentalism about laws. In so doing, I show that Cartwright’s notion of capacity, which plays a large role in her anti-fundamentalism, breaks down into an account of properties defined as I suggest, and that her rejection of fundamentalism must then ultimately fail. Finally I consider a case study to illustrate my claims against Cartwright. I argue that when the structural realist account of properties that I provide is applied to the effective field theory program in quantum field theory, pluralism about ontology and a localist view of theories is well accounted for, but this pluralism nevertheless occurs within fundamentalist context. This conclusion fully undermines Cartwright’s case for anti-fundamentalism. For her, the adoption of her anti-fundamentalism is necessary to account for the ontologically pluralist and locally particular features of science. Indeed, it is the view’s ability to account for these features of science that, for Cartwright, make her view appealing.

2. FUNDAMENTALISM AND THE “DAPPLED WORLD” HYPOTHESIS

Fundamentalism, for Cartwright, is the view that scientific laws apply universally and is closely related to the more familiar but currently unpopular doctrine of reductionism. Reductionists believe that explanations in higher level sciences, such as empirical psychology, can be ultimately reduced to explanations based on more fundamental phenomena, such as those provided by biology, which in turn can be reduced to still more fundamental explanations such as those provided by chemistry. This process of reduction can be carried out until the processes of the higher-level science can be completely understood in terms of fundamental physics. In practice, of course, reductions of this sort are impossible. Most philosophers and scientists hold out little hope for the sort of vertical reductions just described and would not describe themselves as reductionists. However, according to Cartwright, while not perhaps reductionists, most philosophers and scientists still adhere to the only slightly weaker position of fundamentalism.

A fundamentalist might readily acknowledge that the sort of vertical explanatory reduction outlined above might be impossible in