

Introducing foundational theory topics in a theoretical physics laboratory course

Upper year theoretical physics courses are conventionally delivered in a strict didactic form, where the instructor delivers 3 independent hour-long lectures per week. In the didactic method, students are left to work through the related highly complex and lengthy derivations independently. The degree to which these are assessed varies as they are difficult to incorporate into standard didactic course assessments. To help address this gap we developed a “Theoretical Physics Laboratory” course which we were later able to offer and complete a corresponding study on. In this course we use instructional approaches based on scaffolded active learning during a single lengthy session, once per week. The single meeting is designed similar to laboratory based learning for experimental courses, and is modeled after popular “escape-rooms”, where students must work together to finish a flexible list of tasks related to theory topics in different branches of physics. Results from the study provide some evidence for including a course of this style in upper year physics course offerings. In our presentation we will discuss items such as the course design, study and results, instructional methodologies, and the PAALS “Physics and Astronomy Active Learning Space” developed by our department. We will also provide some sample teaching materials and discuss the basic function of the weekly session of the course.

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Session Classification: Nuclear Physics