Duality in string theory

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Abstract: *There were 5 different string theories developed in history and the original thought was that out of 5 candidates, only one of them will serve as the final theory. However, E. Witten pointed out in 1995 that this was actually a wrong idea. These 5 different theories indeed come from certain limit of a bigger theory and they should be dual to each other. Here, "dual" means that there is a dictionary that translates one theory into another. Since then, duality becomes the core idea in string theory.*

In my talks, I will focus on the duality between the Chern-Simons gauge theory and topological string theory. Roughly speaking, it gives a "duality" between the knot theory and geometry of a six-dimensional space, Calabi-Yau space. I will use a simple language newly developed by me and my collaborators to give an introductory description of these fields and I will also discuss some interesting problems and some related famous conjectures if time permits. This is an area that new researchers can enter at many different levels.