Physics plays a fundamental role in the various technologies used in International Nuclear Safeguards. There is a constant desire to improve measurement time and accuracy for safeguards measurement systems to reduce uncertainties during inspections while also reducing the impact on operations at a facility. The field of safeguards has made much progress in the last several decades with highly accurate material assays that are easily reproducible. Future advancements are going to require improvements in analysis techniques and measurement systems along with a detailed understanding of all of the uncertainties. These advancements will rely on improving the understanding of the underlying physics. This talk will provide a brief overview of the development and current status of international nuclear safeguards along with a series of physics challenges that, if addressed, can advance the field beyond the current state of the art.