# 引力波与宇宙学实验室 讲座预告

# Strong Lensing Signatures of Self-Interacting Dark Matter Halos: Advances and Challenges


## 杨大能（紫金山天文台研究员）


杨大能现在是中国科学院紫金山天文台引才计划研究员。他近年来的研究重心是探索宇宙中暗物质的分布和相关的新物理特征。他开发了适于并行计算的暗物质的自相互作用模块，并构建了参数化模型来实现高效和批量的理论预测。他同合作者们开展了从矮星系尺度到星系群尺度的多个大型宇宙学模拟，并对暗物质自相互作用引起的可能观测效应进行了探索。此外，他的研究广泛涉及宇宙的结构生成，暗物质探测，还有对撞机上对规范玻色子的产生等。他博士和本科毕业于北京大学，之前在清华大学和加州大学河滨分校做博后，曾在欧洲核子中心，日本高能加速器研究机构，美国匹兹堡大学等多个机构访问交流。


**摘要**

Self-interacting dark matter (SIDM) has emerged as a compelling solution to small-scale challenges due to its unique dynamical properties, which give rise to both shallower and denser density profiles. In particular, core-collapsing halos can be more concentrated than their cold dark matter counterparts, potentially enhancing strong lensing signals. This talk will begin by outlining the underlying principles driving core formation and collapse in SIDM halos, along with an overview of how we simulate and model these effects. I will then introduce our recent work on modeling strong lensing effects in SIDM, which enables analytical calculations of lensing-specific quantities in generic models. I will also discuss the implications of SIDM for galaxy-galaxy strong lensing observations and its role in explaining observed dense structures perturbing lensed images. To conclude, I will highlight key challenges in making precise predictions and our strategies for improving them.


**时间：　2025年3月12日 (星期三) 9:00**

**地点：　北京师范大学物理楼402**