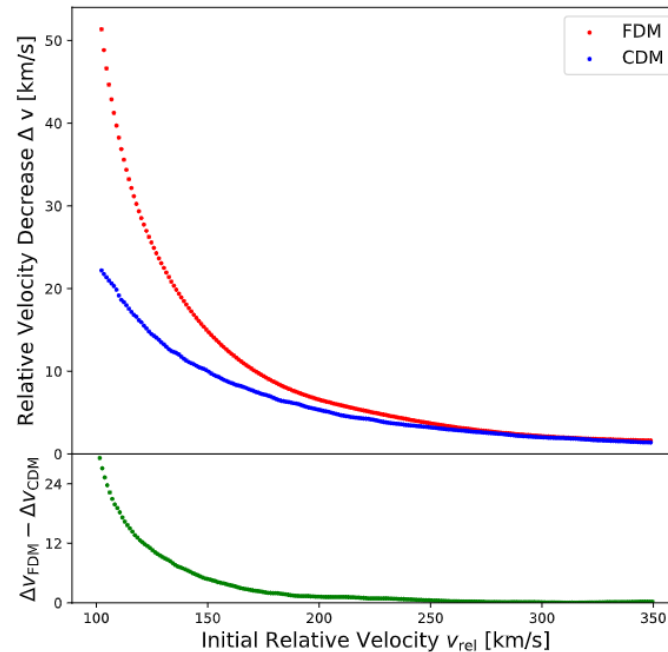
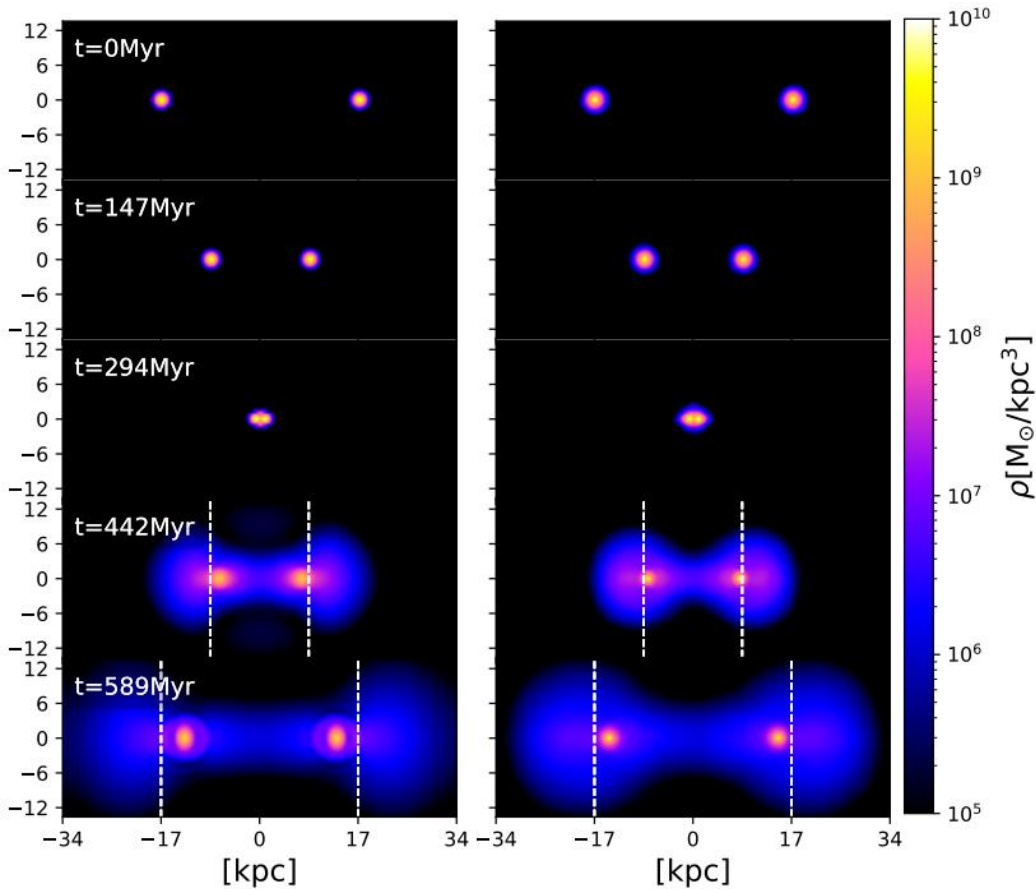


2023 중점연구소 성과보고 1a 우주론 연구실

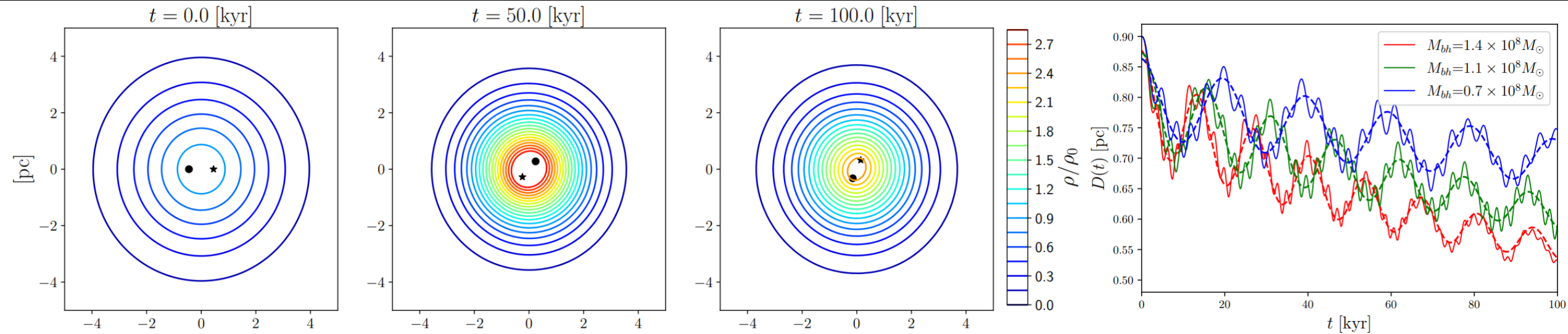
석박사통합과정 구현모

Fuzzy 암흑물질 / 차가운 암흑물질 헤일로들의 정면 충돌 시뮬레이션 비교 (2021~2022)



- 표준 우주론 모형이 따르는 차가운 암흑물질 모델에 비해 Fuzzy한 암흑물질이 동역학적으로 어떤 차이를 보이는지를, 두 헤일로들의 정면 충돌 시뮬레이션을 통해 확인. (Left : Fuzzy DM Halo / Right : Cold DM Halo)

초경량 암흑물질 헤일로 내부에서의 초거대질량 블랙홀 쌍성의 동역학(2023)



- 두 은하가 합쳐질 때, 두 초거대질량 블랙홀의 거리는 약 100억년 이내에 1pc order 이하로 줄어들 수 없다.
[Final Parsec Problem]
- 헤일로를 이루는 암흑물질이 초경량 스칼라 입자라면, 두 블랙홀의 쌍성운동 시 암흑물질 입자의 활발한 탈출에 의해 전체 에너지가 감소함(Gravitational Cooling)을 이용하여 Final Parsec Problem을 해결할 수 있을지도 모른다는 힌트를 줄 수 있다.

학회 발표 및 논문 실적

Final Parsec Problem of Black Hole Mergers and Ultralight Dark Matter

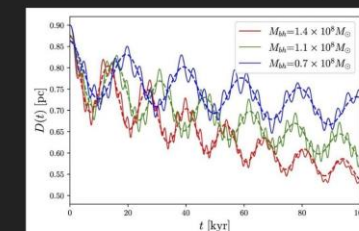
Hyeonmo Koo, Dongsu Bak, Inkyu Park, Sungwook E. Hong, Jae-Weon Lee, PhysRevD submitted in Nov.2023



This image is from a simulation of two merging black holes. The upcoming Vera Rubin Observatory should be able to detect binary black holes before they merge. But the vexing problem of false positives needs a solution. Image Credit: Simulating eXtreme Spacetimes (SXS) Project

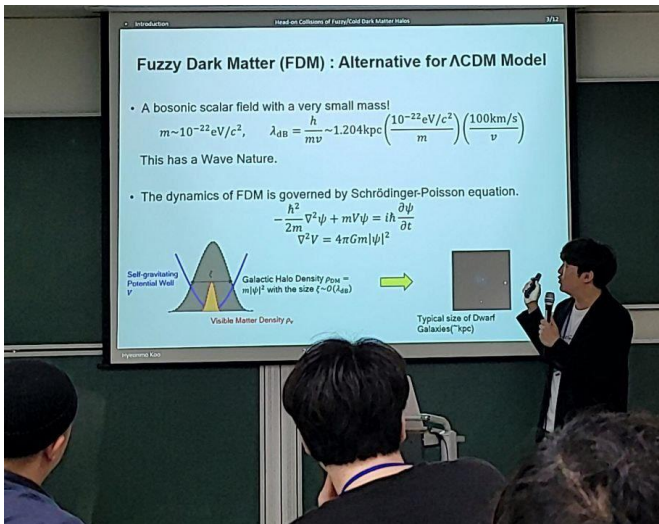
NOVEMBER 25, 2023 BY BRIAN KOBERLEIN

Dark Matter Could Help Solve the Final Parsec Problem of Black Holes



How fuzzy dark matter can increase inspiralling. Credit: Koo, et al

In this new study, the team considers a variation on dark matter known as fuzzy dark matter. It's similar to standard cold dark matter except it is made of low-mass scalar particles. Since these particles wouldn't interact with each other by anything other than gravity, they wouldn't clump in quite the same way as regular dark matter, and thus have a more "fuzzy" distribution.

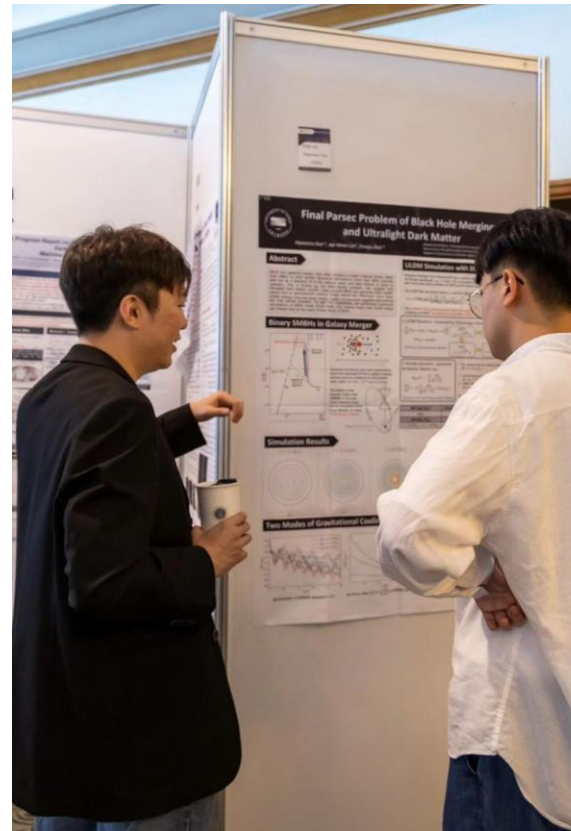


2023 봄 한국물리학회 구두발표



2023 가을 한국물리학회 구두발표

+ 2023 International Workshop on Multi-Probe approach to Wavy Dark Matters @ Korea Univ, Seoul, 구두발표



2023 가을 한국천문학회 포스터발표