# Accretion in Reissner–Nordström spacetime

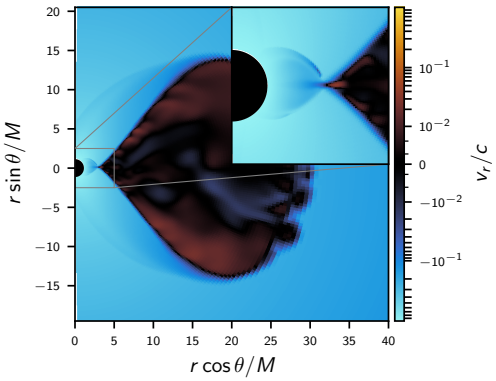
Tomasz Krajewski Nicolaus Copernicus Astronomical Center

# Publications from previous year

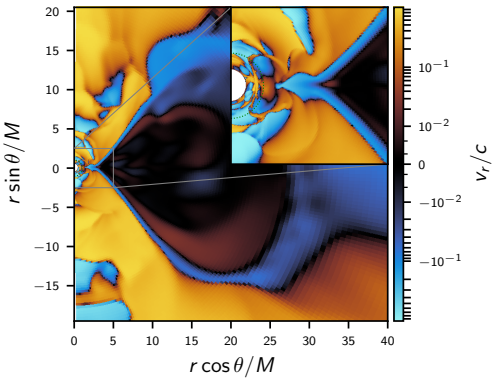
1. "Outflows from Naked Singularities, Infall through the Black Hole Horizon: Hydrodynamic Simulations of Accretion in the Reissner–Nordström Space-Time" published in Phys. Rev. Lett.
2. "Fluid figures of equilibrium orbiting Reissner–Nordström black holes and naked singularities" published in Phys. Rev. D
3. "Bubble-wall velocity in local thermal equilibrium: hydrodynamical simulations vs analytical treatment" published in JHEP
4. "Thermalization effects on the dynamics of growing vacuum bubbles" submitted
5. "Steady-state bubbles beyond local thermal equilibrium" submitted
6. "Accretion onto Reissner-Nordström naked singularities" in preparation

# Outflows from Naked Singularities, Infall through the Black Hole Horizon

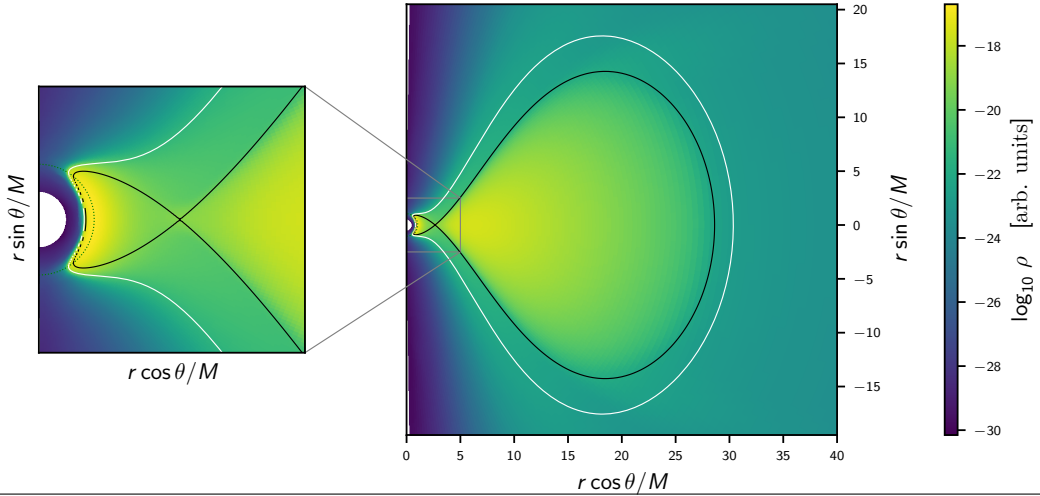
$Q = 0.99M$




$Q = 1.02M$



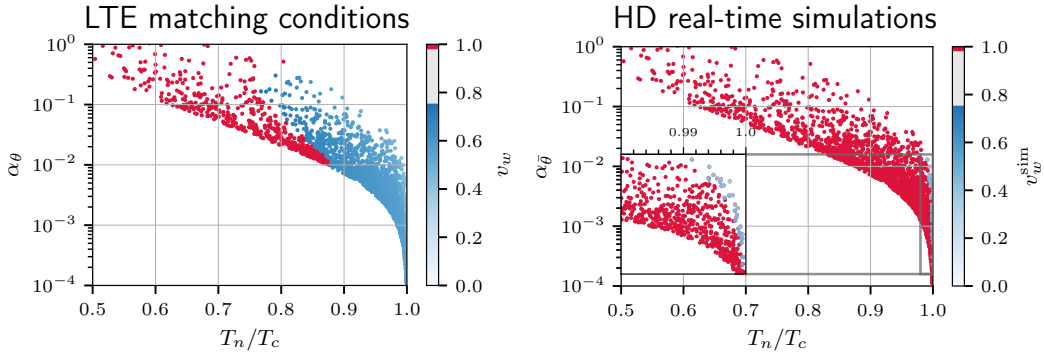
# Accretion onto naked singularity



# Winding road from Koral to Koral+

- Tiding up problems' specification files.
- `pyKoral` post-processing scripts without auxiliary `sim` files from `Cython` wrapper of `Koral`.
- Generalization of implementation of Polish donut and Fishbone–Moncrief torus to generic axisymmetric background metric.
- Robust procedure for conversion from conserved quantities to so-called primitive ones (work in progress).
- Porting `NSKoral` by David Abarca into `Koral++` (work in progress).

# Bubble-wall velocity in local thermal equilibrium and beyond[1,2]





1. Krajewski, T. *et al. JHEP* **05,** 011. arXiv: 2402.15408 [astro-ph.CO] (2024).
2. Krajewski, T. *et al.* arXiv: 2411.16580 [astro-ph.CO] (Nov. 2024).

# Main results from previous year

1. "Outflows from Naked Singularities, Infall through the Black Hole Horizon: Hydrodynamic Simulations of Accretion in the Reissner–Nordström Space-Time" published in Phys. Rev. Lett.
2. Three papers (including PRL letter) published in 2025 and two more submitted.
3. Simulations of accretion onto electrically charged compact objects (described by Reissner-Nordström spacetime metric).
4. Refactorization of certain parts of the Koral code to be more robust.

Thank you for your attention.