

## TITLE

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## ABSTRACT

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### 1. INTRODUCTION

### 2. METHODOLOGY

We simulate 3D special relativistic hydrodynamics with passive CR injections from the GC using the GPU code GAMER-SR (Tseng et al. 2021).

where the five conserved quantities of gas  $D$ ,  $M^i$ , and  $\tilde{E}$  are the mass density, the momentum densities, and the reduced energy density, respectively.  $\gamma$  and  $U^j$  are the temporal and spatial component of four-velocity of gas.  $p_{\text{gas}}$  is the pressure of gas.  $p_{\text{cr}}$  and  $e_{\text{cr}}$  are the CR pressure and CR energy density.  $c$  is the speed of light, and  $\delta^{ij}$  is the Kronecker delta notation. Throughout this paper, Latin indices run from 1 to 3, except when stated otherwise.

$$\partial_t D + \partial_j (DU^j/\gamma) = 0, \quad (1a)$$

$$\partial_t M^i + \partial_j (M^i U^j/\gamma + p_{\text{gas}} \delta^{ij}) = 0, \quad (1b)$$

$$\partial_t \tilde{E} + \partial_j [(\tilde{E} + p_{\text{gas}}) U^j/\gamma] = 0, \quad (1c)$$

$$\partial_t (\gamma e_{\text{cr}}) + \partial_j (e_{\text{cr}} U^j) = -p_{\text{cr}} \left( \frac{\partial \gamma}{\partial t} + \frac{1}{c} \partial_j U^j \right), \quad (1d)$$

### 2.1. Assumptions and Numerical Techniques

### 2.2. The Galactic Model

### 2.3. Jet injection

### 3. CONCLUSIONS

The data underlying this article are available in the article and in its online supplementary material.

## REFERENCES

Tseng P.-H., Schive H.-Y., Chiueh T., 2021, [Monthly Notices of the Royal Astronomical Society](#), 504, 3298

## DATA AVAILABILITY

## APPENDIX