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**Optimal time decay rates for the compressible Navier-Stokes system with and without Yukawa-type potential.** (English) [Zbl 1444.35123](#)

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Summary: We consider the time decay rates of smooth solutions to the Cauchy problem for the compressible Navier-Stokes system with and without a Yukawa-type potential. We prove the existence and uniqueness of global solutions by the standard energy method under small initial data assumptions. Furthermore, if the initial data belong to  $L^1(\mathbb{R}^3)$ , we establish the optimal time decay rates of the solution as well as its higher-order spatial derivatives. In particular, we obtain the optimal decay rates of the highest-order spatial derivatives of the velocity. Finally, we derive the lower bound time decay rates for the solution and its spacial derivatives.

**MSC:**

[35Q30](#) Navier-Stokes equations

[76N15](#) Gas dynamics, general

**Keywords:**

[compressible flow](#); [energy method](#); [optimal decay rates](#)

**Full Text:** [Link](#)

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