


Name:	<b>Shunsuke Yabunaka</b>	
Affiliation:	Advanced Science Research Center, Japan Atomic Energy Agency	
Email:	yabunaka123@gmail.com	
Academic degree:	PhD in Physics, Kyoto University (2014)	
Professional Experience:	2014 – 2016 Postdoc (JSPS), Yukawa Institute for Theoretical Physics, Kyoto University 2016 –2018 Fukui Fellow, Fukui Institute for Fundamental Chemistry, Kyoto University 2019 –2021 Assistant Professor, Kyoto University 2022- Researcher, Advanced Science Research Center, Japan Atomic Energy Agency	
Current Research:	Phase transition, Hydrodynamics, Active matter	

## **Drag coefficient of a rigid spherical particle in a near-critical binary fluid mixture, beyond the regime of the Gaussian model**

Shunsuke Yabunaka<sup>1</sup>, Youhei Fujitani<sup>2</sup>

<sup>1</sup> Advanced Science Research Center, Japan Atomic Energy Agency

<sup>2</sup> School of Fundamental Science and Technology, Keio University

The drag coefficient of a rigid spherical particle deviates from Stokes law when it is put into a near-critical fluid mixture in the homogeneous phase with the critical composition. The deviation ( $\Delta\gamma_d$ ) is experimentally shown to depend approximately linearly on the correlation length of the composition fluctuation far from the particle ( $\xi_\infty$ ), and is suggested to be caused by the preferential adsorption between one component and the particle surface. We employ a local renormalized functional theory that can describe cases where the correlation length is not spatially uniform, due to the preferential adsorption near the critical point. We show that, as  $\xi_\infty$  becomes larger, the dependence of  $\Delta\gamma_d$  on  $\xi_\infty$  becomes close to the linear dependence.