

## 1) Curriculum Vitae

Formal Name (Pen Name)	Ryohei Nakatani (Riouhei Nakatani)
Position	JSPS Oversea Fellow
Section	3263 – Interstellar and Heliospheric Physics
Office	169-531
E-Mail	ryohei.nakatani@jpl.nasa.gov
Phone	(626)517-9421



### 1. Education

- Ph.D. Apr. 2016 – Mar. 2019 Department of Physics, School of Science,  
The University of Tokyo, Tokyo, Japan  
*Thesis title:* “Photoevaporation of Protoplanetary Disks and Molecular  
Cloud Cores in Star-Forming Regions”  
*Supervisor:* Prof. Naoki Yoshida
- M.Sc. Apr. 2014 – Mar. 2016 (Same as above)  
*Thesis title:* “Photo-evaporation of a protoplanetary disk”
- B.Sc. Apr. 2010 – Mar. 2014 Department of Physics, Faculty of Science,  
Osaka University, Osaka, Japan  
*Thesis title:* “Lifetimes of High-Dimensional Blackholes”  
*Supervisor:* Prof. Koji Hashimoto

### Other educational backgrounds

- Oct. 2017 – Dec. 2017 JPL Visiting Student Research Program  
*Host institute:* NASA Jet Propulsion Laboratory (JPL), CA, USA  
*Host supervisor:* Dr. Neal Turner (Group supervisor at JPL)
- Oct. 2014 – Mar. 2019 Advanced Leading Graduate Course for Photon Science (ALPS)  
*Organization:* The University of Tokyo, Tokyo, Japan  
*Supervisors:* Prof. Hiromoto Shibahashi, Prof. Satoshi Yamamoto

### 2. Fellowships

- Aug. 2022 – Jul. 2024 JSPS Oversea Fellow
- Apr. 2019 – Jul. 2022 RIKEN Special Postdoctoral Researcher
- Apr. 2016 – Mar. 2019 Japan Society for the Promotion of Science (DC1) fellow
- Oct. 2014 – Mar. 2019 ALPS fellow

### 3. Publication List

#### 3-(i) Corresponding-authored, refereed papers

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1. [Riouhei Nakatani](#) and Shinsuke Takasao, “Anatomy of Photoevaporation Base: Linking the Property of the Launched Wind to Irradiation Flux”, *The Astrophysical Journal*, 930, 124-137 (2022)
  2. [Riouhei Nakatani](#), Hiroshi Kobayashi, Rolf Kuiper, Hideko Nomura, and Yuri Aikawa, “Photoevaporation of Grain-Depleted Protoplanetary Disks around Intermediate-Mass Stars: Investigating the Possibility of Gas-Rich Debris Disks as Protoplanetary Remnants”, *The Astrophysical Journal*, 915, 90-111 (2021)
  3. [Riouhei Nakatani](#), Anastasia Fialkov, and Naoki Yoshida, “Photoevaporation of Minihalos During Cosmic Reionization: Primordial and Metal-enriched Halos”, *The Astrophysical Journal*, 905, 151-168 (2020)
  4. [Riouhei Nakatani](#), Hauyu Baobab Liu, Satoshi Ohashi, Yichen Zhang, Tomoyuki Hanawa, Claire Chandler, Yoko Oya, and Nami Sakai, “Substructure Formation in a Protostellar Disk of L1527 IRS”, *The Astrophysical Journal Letters*, 895, L2-15 (2020)
  5. [Riouhei Nakatani](#) and Naoki Yoshida, “Photoevaporation of Molecular Gas Clumps Illuminated by External Massive Stars: Clump Lifetimes and Metallicity Dependence”, *The Astrophysical Journal*, 883, 127-142 (2019)
  6. [Riouhei Nakatani](#), Takashi Hosokawa, Naoki Yoshida, Hideko Nomura, and Rolf Kuiper, “Radiation Hydrodynamics Simulations of Photoevaporation of Protoplanetary Disks II: Metallicity Dependence of UV and X-Ray Photoevaporation”, *The Astrophysical Journal*, 865, 75-87 (2018)
  7. [Riouhei Nakatani](#), Takashi Hosokawa, Naoki Yoshida, Hideko Nomura, and Rolf Kuiper, “Radiation Hydrodynamics Simulations of Photoevaporation of Protoplanetary Disks by Ultraviolet Radiation: Metallicity Dependence”, *The Astrophysical Journal*, 857, 57-78, (2018)

### **3–(ii) Other refereed papers**

7. Muneaki Imai, Yoko Oya, et al. “Chemical and Physical Characterization of the Isolated Protostellar Source CB68: FAUST IV”, *The Astrophysical Journal*, 934, 70-77 (2022)
  8. Yuki Ohno, Takahiro Oyama, Akemi Tamanai, Shaoshan Zeng, Yoshimasa Watanabe, [Riouhei Nakatani](#), Takeshi Sakai, and Nami Sakai, “Laboratory Measurement of Millimeter-wave Transitions of  $^{13}\text{CH}_2\text{DOH}$  for Astronomical Use”, *The Astrophysical Journal*, 932, 101-108 (2022)
  9. Hiroto Mitani, [Riouhei Nakatani](#), and Naoki Yoshida, “Stellar wind effect on the atmospheric escape of hot Jupiters and their Ly  $\alpha$  and H  $\alpha$  transits”, *MNRAS*, 512, 855-860 (2022)
  10. Kohei Inayoshi, [Riouhei Nakatani](#), Daisuke Toyouchi, Takashi Hosokawa, Rolf Kuiper, and Masafusa Onoue, “Rapid Growth of Seed Black Holes during Early Bulge Formation”, *The Astrophysical Journal*, 927, 237-257 (2022)
  11. Satoshi Ohashi, Claudio Codella, et al. “Misaligned Rotations of the Envelope, Outflow, and Disks in the Multiple Protostellar System of VLA 1623-2417: FAUST. III”, *The Astrophysical Journal*, 927, 54-75 (2022)
  12. Ayano Komaki, [Riouhei Nakatani](#), and Naoki Yoshida, “Radiation Hydrodynamics Simulations of Protoplanetary Disks: Stellar Mass Dependence of the Disk Photoevaporation Rate”, *The Astrophysical Journal*, 910, 51-62 (2021)
  13. Yuki Okoda, Yoko Oya, et al., “FAUST. II. Discovery of a Secondary Outflow in IRAS 15398-3359: Variability in Outflow Direction during the Earliest Stage of Star Formation?”, *The Astrophysical Journal*, 910, 11-23 (2021)
  14. Satoshi Ohashi, Hiroshi Kobayashi, [Riouhei Nakatani](#), Satoshi Okuzumi, Hidekazu Tanaka, Koji Murakawa, Yichen Zhang, Hauyu Baobab Liu, and Nami Sakai, “Ring Formation by Coagulation of Dust Aggregates in the Early Phase of Disk Evolution around a Protostar,” *The Astrophysical Journal*, 907, 80-91 (2021)
  15. Lixandra Flores-Rivera, Mario Flock, and [Riouhei Nakatani](#), “Hydrodynamical simulations of protoplanetary disks including irradiation of stellar photons. I. Resolution study for vertical shear instability”, *Astronomy & Astrophysics*, 644, 50-57 (2020)
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16. E. Bianchi, C. J. Chandler, et al., “FAUST I. The hot corino at the heart of the prototypical Class I protostar L1551 IRS5”, *Monthly Notices of the Royal Astronomical Society: Letters*, 498, L86-92 (2020)
17. Daisuke Toyouchi, Takashi Hosokawa, Kazuyuki Sugimura, Riouhei Nakatani, and Rolf Kuiper, “Super-Eddington accretion of dusty gas onto seed black holes: metallicity-dependent efficiency of mass growth,” *Monthly Notices of the Royal Astronomical Society*, 483, 2031-2043 (2019)

### **3 – (iii) Submitted (non-refereed) papers**

18. Vastel, C., Alves, F., et al. “Hot methanol in the [BHB2007] 11 protobinary system: hot corino versus shock origin? : FAUST V”, arXiv: 2206.10176
19. Ayano Komaki, Riouhei Nakatani, Rolf Kuiper, and Naoki Yoshida, “The effect of ultra-violet photon pumping of H<sub>2</sub> in dust-deficient protoplanetary disks”, arXiv:2202.02804
20. Satoshi Ohashi, Riouhei Nakatani, Haiyu Baobab Liu, Hiroshi Kobayashi, Yichen Zhang, Tomoyuki Hanawa, Nami Sakai, “Formation of dust clumps with sub-Jupiter mass and cold shadowed region in gravitationally unstable disk around Class 0/I protostar in L1527 IRS”, arXiv: 2206.07799
21. Hiroto Mitani, Riouhei Nakatani, and Naoki Yoshida, “Atmospheric Escape of Close-in Giants around Hot Stars: Far-Ultraviolet Radiation and Photoelectric Heating Effect,” submitted to *ApJ*, arXiv-eprint, arXiv:2005.08676 (2020)

### **4. Outreach** (listed in the order of title, publishing institutes, publication date, URL)

- Interview: 「クローズアップ科学道」 (interview to a front-runner researcher at RIKEN), RIKEN, Sep 2021 (online publication), Oct 2021 (printed matter publication), URL: <https://www.riken.jp/pr/closeup/2021/index.html>
- Press release: 「惑星の母天体、実は長生き？」 (“The parental body of planets can survive longer than previously thought”), RIKEN & Nagoya University, Jul 12, 2021, URL: [https://www.riken.jp/press/2021/20210712\\_1/index.html](https://www.riken.jp/press/2021/20210712_1/index.html)
- Press release: 「惑星は恒星と同時に作られていく？」 (“Planets and the host star may form together?”), RIKEN & Nagoya University & ASIAA, Jan 22, 2021, URL: [https://www.riken.jp/press/2021/20210122\\_1/index.html](https://www.riken.jp/press/2021/20210122_1/index.html)

### **5. Mentoring & Teaching**

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| Apr. 2019 – present   | Mentoring a Ph.D. student at the University of Tokyo (supervisor: Prof. Naoki Yoshida) (Obtained master’s degree in Mar. 2020. Two papers publication (3-(ii)-9, 3-(iii)-21))   |
| Oct. 2019 – present   | Mentoring a Ph.D. student at the University of Tokyo (supervisor: Prof. Naoki Yoshida)<br>(Obtained master’s degree in Mar. 2022 and prize awarded by School of Science at the University of Tokyo. Two papers publication (3-(ii)-12, 3-(iii)-19)) |
| Oct. 2015 – Mar. 2016 | Teaching assistant for a lecture on analytic mechanics at the University of Tokyo (lecturer: Prof. Naoki Yoshida)   |

Apr. 2016 – Sep. 2016

Teaching assistant for a lecture on fluid dynamics at the University of Tokyo  
(lecturer: Prof. Naoki Yoshida)

## Publication List

### 3-(i) Corresponding-authored, refereed papers (the citation count is at the last of each item)

8. Riouhei Nakatani, Hiroshi Kobayashi, Rolf Kuiper, Hideko Nomura, and Yuri Aikawa, “Photoevaporation of Grain-Depleted Protoplanetary Disks around Intermediate-Mass Stars: Investigating the Possibility of Gas-Rich Debris Disks as Protoplanetary Remnants”, *The Astrophysical Journal*, 915, 90-111 (2021), citation count: 1
9. Riouhei Nakatani, Anastasia Fialkov, and Naoki Yoshida, “Photoevaporation of Minihalos During Cosmic Reionization: Primordial and Metal-enriched Halos”, *The Astrophysical Journal*, 905, 151-168 (2020), citation count: 4
10. Riouhei Nakatani, Haoyu Baobab Liu, Satoshi Ohashi, Yichen Zhang, Tomoyuki Hanawa, Claire Chandler, Yoko Oya, and Nami Sakai, “Substructure Formation in a Protostellar Disk of L1527 IRS”, *The Astrophysical Journal Letters*, 895, L2-15 (2020), citation count: 4
11. Riouhei Nakatani and Naoki Yoshida, “Photoevaporation of Molecular Gas Clumps Illuminated by External Massive Stars: Clump Lifetimes and Metallicity Dependence”, *The Astrophysical Journal*, 883, 127-142 (2019), citation count: 11
12. Riouhei Nakatani, Takashi Hosokawa, Naoki Yoshida, Hideko Nomura, and Rolf Kuiper, “Radiation Hydrodynamics Simulations of Photoevaporation of Protoplanetary Disks II: Metallicity Dependence of UV and X-Ray Photoevaporation”, *The Astrophysical Journal*, 865, 75-87 (2018), citation count: 24
13. Riouhei Nakatani, Takashi Hosokawa, Naoki Yoshida, Hideko Nomura, and Rolf Kuiper, “Radiation Hydrodynamics Simulations of Photoevaporation of Protoplanetary Disks by Ultraviolet Radiation: Metallicity Dependence”, *The Astrophysical Journal*, 857, 57-78, (2018), citation count: 35

### 3-(ii) Other refereed papers

22. Ayano Komaki, Riouhei Nakatani, and Naoki Yoshida, “Radiation Hydrodynamics Simulations of Protoplanetary Disks: Stellar Mass Dependence of the Disk Photoevaporation Rate”, *The Astrophysical Journal*, 910, 51-62 (2021)
23. Yuki Okoda, Yoko Oya, Logan Francis, Doug Johnstone, Shu-ichiro Inutsuka, Cecilia Ceccarelli, Claudio Codella, Claire Chandler, Nami Sakai, Yuri Aikawa, Felipe O. Alves, Nadia Balucani, Eleonora Bianchi, Mathilde Bouvier, Paola Caselli, Emmanuel Caux, Steven Charnley, Spandan Choudhury, Marta De Simone, Francois Dulieu, Aurora Durán, Lucy Evans, Cécile Favre, Davide Fedele, Siyi Feng, Francesco Fontani, Tetsuya Hama, Tomoyuki Hanawa, Eric Herbst, Tomoya Hirota, Muneaki Imai, Andrea Isella, Izaskun Jiménez-Serra, Claudine Kahane, Bertrand Lefloch, Laurent Loinard, Ana López-Sepulcre, Luke T. Maud, María José Maureira, Francois Menard, Seyma Mercimek, Anna Miotello, George Moellenbrock, Shoji Mori, Nadia M. Murillo, Riouhei Nakatani, Hideko Nomura, Yasuhiro Oba, Ross O'Donoghue, Satoshi Ohashi, Juan Ospina-Zamudio, Jaime E. Pineda, Linda Podio, Albert Rimola, Takeshi Sakai, Dominique Segura-Cox, Yancy Shirley, Brian Svoboda, Vianney Taquet, Leonardo Testi, Charlotte Vastel, Serena Viti, Naoki Watanabe, Yoshimasa Watanabe, Arezu Witzel, Ci Xue, Yichen Zhang, Bo Zhao, and Satoshi Yamamoto, “FAUST. II. Discovery of a Secondary Outflow in IRAS 15398-3359: Variability in Outflow Direction during the Earliest Stage of Star Formation?”, *The Astrophysical Journal*, 910, 11-23 (2021)
24. Satoshi Ohashi, Hiroshi Kobayashi, Riouhei Nakatani, Satoshi Okuzumi, Hidekazu Tanaka, Koji Murakawa, Yichen Zhang, Haoyu Baobab Liu, and Nami Sakai, “Ring Formation by Coagulation of Dust Aggregates in the Early Phase of Disk Evolution around a Protostar,” *The Astrophysical Journal*, 907, 80-91 (2021)

25. Lixandra Flores-Rivera, Mario Flock, and Riouhei Nakatani, “Hydrodynamical simulations of protoplanetary disks including irradiation of stellar photons. I. Resolution study for vertical shear instability”, *Astronomy & Astrophysics*, 644, 50-57 (2020)
26. E. Bianchi, C. J. Chandler, C. Ceccarelli, C. Codella, N. Sakai, A. López-Sepulcre, L. T. Maud, G. Moellenbrock, B. Svoboda, Y. Watanabe, T. Sakai, F. Ménard, Y. Aikawa, F. Alves, N. Balucani, M. Bouvier, P. Caselli, E. Caux, S. Charnley, M. S. DeSimoneChoudhury, F. Dulieu, A. Durán, L. Evans, C. Favre, D. Fedele, S. Feng, F. Fontani, L. Francis, T. Hama, T. Hanawa, E. Herbst, T. Hirota, M. Imai, A. Isella, I. Jiménez-Serra, D. Johnstone, C. Kahane, B. Lefloch, L. Loinard, M. J. Maureira, S. Mercimek, A. Miotello, S. Mori, R. Nakatani, H. Nomura, Y. Oba, S. Ohashi, Y. Okoda, J. Ospina-Zamudio, Y. Oya, J. Pineda, L. Podio, A. Rimola, D. SeguraCox, Y. Shirley, V. Taquet, L. Testi, C. Vastel, S. Viti, N. Watanabe, A. Witzel, C. Xue, Y. Zhang, B. Zhao, and S. Yamamoto, “FAUST I. The hot corino at the heart of the prototypical Class I protostar L1551 IRS5”, *Monthly Notices of the Royal Astronomical Society: Letters*, 498, L86-92 (2020)
27. Daisuke Toyouchi, Takashi Hosokawa, Kazuyuki Sugimura, Riouhei Nakatani, and Rolf Kuiper, “Super-Eddington accretion of dusty gas onto seed black holes: metallicity-dependent efficiency of mass growth,” *Monthly Notices of the Royal Astronomical Society*, 483, 2031-2043 (2019)

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28. Riouhei Nakatani, and Shinsuke Takasao, “Anatomy of Photoevaporation Base: Linking the Property of the Launched Wind to Irradiation Flux”, submitted to *ApJ* (2021)
29. Hiroto Mitani, Riouhei Nakatani, and Naoki Yoshida, “Atmospheric Escape of Close-in Giants around Hot Stars: Far-Ultraviolet Radiation and Photoelectric Heating Effect,” submitted to *ApJ*, arXiv-eprint, arXiv:2005.08676 (2020)