

# Curriculum Vitae

## prof. dr. sc. Janka Petravić

### Kvalifikacije

- Izvanredni profesor, Sveučilište u Rijeci, Hrvatska, 2007.
- Dr. sc. (PhD) , doktorska disertacija "Properties of the Lorenz Gas Attractor", voditelj prof. dr. sc. Dennis Isbister, University of New South Wales, Australija, 1994.
- Dipl. ing. fizike, diplomski rad "", voditelj prof. dr. sc. Marijan Šunjić, Sveučilište u Zagrebu, Zagreb, Hrvatska, 1981.

### Radno iskustvo

- Senior Research Fellow | Burnet Institute, Melbourne, Australija | 2016.-2018.
- Research Fellow | Kirby Institute, Sydney, Australija | 2015.-2016.
- Senior Research Fellow | University of New South Wales, Sydney, Australija | 2011.-2014.
- Research Fellow | University of New South Wales, Sydney, Australija | 2007.-2010.
- Research Fellow | University of Sydney, Australija | 2004.-2006.
- Institute of Advanced Studies Fellow | Australian National University, Canberra, Australija | 2000.-2004.
- Research Fellow | Université du Paris-Sud and Total Research, Pariz, Francuska | 1998.-2000.
- Postdoctoral Fellow | Australian National University, Canberra, Australija | 1994.-1998.

### Glavna područja znanstvenoga rada

- Molekularna dinamika (MD) i Monte Carlo simulacije tekućina i graničnih površina: transportni fenomeni
- Razvoj novih teorijskih metoda za računanje transportnih koeficijenata za impuls i energiju (tlak i toplinu)
- Hidrodinamika
- Modeliranje infekcije, imunoloških reakcija i tretmana HIV infekcije i malarije u ljudskom tijelu na osnovu eksperimentalnih podataka vodećih međunarodnih istraživačkih grupa
- Razvoj programa financijske optimizacije za proširenje skale intervencija dječje prehrane u zemljama niskih i srednje-niskih prihoda za Svjetsku banku
- Primjena programa za financiranje intervencija protiv HIV infekcije u različitim zemljama

### Akadska priznanja

- 1991. Rector Doctoral Scholarship (UNSW, Australija)
- 1994. Ria de Groot Prize for the best PhD Thesis, Australija
- 2000. ANU Institute of Advanced Studies Research Fellowship, Australija

### Vođenje doktorata

- 2007.-2010. Ming-Liang Chan: "Viral pathogenesis of human and simian immunodeficiency virus".

- 2008.-2012. Mehala Balamurali: "What can we learn about HIV infection from the dynamics of escape?"
- 2009.-2013. Mykola Pinkevych: "Mathematical modelling of the dynamics of malaria infection".
- 2012.-2015. Alexey Martyushev: "Mathematical modelling of infectious diseases".

## **Veliki znanstveni projekti**

- 2012.-2014. NHMRC Project Grant "The intracellular dynamics of HIV"
- 2010.-2013. ARC Discovery Grant "Analysis of T cell migration"
- 2009.-2011. NHMRC Project Grant "CD4+ T cells in HIV – regulator or target of viral infection: A modelling approach"
- 2000.-2003. Institute of Advanced Studies Fellowship "Diffusion, Viscosity and Thermal Conductivity in Ionic Systems and Electrolytes".

## **Znanstvena djelatnost**

U svome znanstvenom radu bavila sam se teorijskim istraživanjima u fizici kondenzirane materije i kemijskoj fizici, primjeni fizikalnih modela na modeliranje bioloških sistema, te razvojem programa financiranja i financijske optimizacije.

Moji glavni interesi na području računarske statističke fizike kondenzirane materije su fenomeni disipacije, trenja i ne-newtonovskog ponašanja tekućina. Primjenom ravnotežne i neravnotežne molekularne dinamike (MD) i Monte Carlo simulacija proučavala sam transportne fenomene (difuziju, viskoznost i toplinsku vodljivost) u tekućinama i na graničnim površinama. Također sam razvila nove teorijske metode za računanje transportnih koeficijenata za tlak i toplinu u nehomogenim sistemima ograničenog volumena, sistemima s elektrostatskim interakcijama, i sistemima u vremenski-ovisnim vanjskim poljima.

Posljednjih sam se godina intenzivno bavila problemima vezanim za biološka i medicinska istraživanja u kojima sam koristila mehanističke modele (teorija dinamičkih sistema i stohastičko modeliranje) u za opis infekcije, imunoloških reakcija i tretmana HIV infekcije i malarije u ljudskom tijelu na osnovu eksperimentalnih podataka vodećih međunarodnih istraživačkih grupa. Također sam radila na epidemiološkim i zdravstveno-ekonomskim modelima primijenjenim na probleme HIV infekcije i neishranjenosti djece u nerazvijenim zemljama.

## Znanstveni radovi

### I. Članci u znanstvenim časopisima (75)

### II. Izvještaji i diskusijski članci (3)

### III. Poglavlja u knjigama (1)

#### I. Članci u znanstvenim časopisima

1. **J. Petravic**, D. J. Isbister and G. P. Morriss, "Correlation dimension of the sheared hard-disk Lorentz gas", *J. Stat. Phys.* **76**, 1045-1063 (1994) (IF=1.496)
2. **J. Petravic** and D. J. Isbister, "Pressure tensor of hard-disk Lorentz gas", *Phys. Rev. E* **51**, 4309-4318 (1995). (IF=2.284)
3. **J. Petravic** and D. J. Evans, "Non-linear response for time-dependent external fields", *Phys. Rev. Lett.* **78**, 1199-1202 (1997) (IF=8.839)
4. **J. Petravic** and D. J. Evans, "Nonlinear response for non-autonomous systems", *Phys. Rev. E* **56**, 1207-1217 (1997) (IF=2.284)
5. **J. Petravić** and D. J. Evans, "The Kawasaki distribution for non-autonomous systems", *Phys. Rev. E* **58**, 2624-2627 (1998). (IF=2.284)
6. **J. Petravic** and D. J. Evans, "Approach to the non-equilibrium time-periodic state in a 'steady' shear flow model", *Mol. Phys.* **95**, 219-1231 (1998) (IF=1.704)
7. **J. Petravic** and D. J. Evans, "Nonlinear response for time-dependent fields: shear flow and color conductivity", *Int. J. Thermophys.* **19**, 1049-62 (1998)
8. **J. Petravic** and D. J. Evans, "The Kawasaki and transient time correlation function response theories for non-autonomous systems", in *Statistical physics: Experiments, theories and computer simulations*, Proceedings of the 2<sup>nd</sup> Tohwa University International Meeting, November 1997 (Eds. M. Tokuyama, I. Oppenheim), World Scientific, Chapter V, 209-212 (1998)
9. **J. Petravic** and D. J. Evans, "Time dependent nonlinear response theory", *Trends in Statistical Physics* **2**, 85-95 (1998)
10. B. Rousseau and **J. Petravić**, "Transport coefficients of xylene isomers", *J. Phys. Chem. B* **106**, 13010-13017 (2002). (IF=3.146)
11. **J. Petravic** and J. Delhommelle, "Influence of temperature, pressure and internal degrees of freedom on hydrogen bonding and diffusion in liquid ethanol", *Chem. Phys.* **286**, 303-314 (2003) (IF=1.707)
12. J. Delhommelle and **J. Petravić**, "Shear viscosity of molten sodium chloride", *J. Chem. Phys.* **118**, 2783-2791 (2003). (IF=2.843)
13. **J. Petravic** and O. G. Jepps, "Homogeneous shear flow of a hard sphere fluid: Analytic solutions", *Phys. Rev. E* **67**, 021105/1-11 (2003) (IF=2.284)
14. **J. Petravic** and J. Delhommelle, "Conductivity of molten sodium chloride and its supercritical vapor in strong dc electric fields", *J. Chem. Phys.* **118**, 7477-7485 (2003). (IF=2.843)
15. **J. Petravić**, "Some properties of isolated systems in external fields", *Phys. Rev. E* **68**, 011104/1-9, (2003). (IF=2.284)
16. J. Delhommelle, **J. Petravic** and D. J. Evans, "Reexamination of string phase and shear thickening in simple fluids", *Phys. Rev. E.* **68**, 031201/1-6, (2003). (IF=2.284)
17. **J. Petravic** and J. Delhommelle, "Conductivity of molten sodium chloride in an alternating electric field", *J. Chem. Phys.* **119**, 8511-8518 (2003). (IF=2.843)
18. J. Delhommelle, **J. Petravic** and D. J. Evans, "On the effects of assuming flow profiles in nonequilibrium simulations", *J. Chem. Phys.* **119**, 11005 (2003). (IF=2.843)

19. **J. Petravic** and J. Delhommelle, "Non-equilibrium molecular dynamics simulations of molten sodium chloride", *Int. J. Thermophysics* **25**, 1375-1393 (2004).
20. J. Delhommelle, **J. Petravić** and D. J. Evans, Non-Newtonian behaviour in simple fluids", *J. Chem. Phys.* **120**, 6117 (2004). (IF=2.843)
21. O. J. Jepps and **J. Petravic**, "Color conductivity of hard spheres", *Mol. Phys.* **102**, 513-523 (2004). (IF=1.704)
22. **J. Petravic**, "Influence of strain on transport in dense Lennard-Jones systems", *J. Chem. Phys.* **120**, 7041-7049 (2004). (IF=2.843)
23. **J. Petravic**, "Shear stress relaxation in liquids", *J. Chem. Phys.* **120**, 10188-10193 (2004). (IF=2.843)
24. **J. Petravic**, "Cooperative effects, transport and entropy in simple liquids", *J. Chem. Phys.* **121**, 11202-11207 (2004). (IF=2.843)
25. **J. Petravic**, "Time dependence of phase variables in a steady shear flow algorithm", *Phys. Rev. E* **71**, 011202-1/7 (2005). (IF=2.284)
26. **J. Petravic**, "Viscoelasticity and elastic after-effect in an ideal crystal", *Phys. Rev. B* **72**, 014108-1/10 (2005). (IF=3.813)
27. **J. Petravic** and J. Delhommelle, "Hydrogen bonding in ethanol under shear", *J. Chem. Phys.* **122**, 234509-1/5 (2005). (IF=2.843)
28. **J. Petravic**, "Shear stress correlation length at constant pressure", *Fizika A (Zagreb)* **14**, 179-186 (2005).
29. J. Delhommelle and **J. Petravic**, "Shear thickening in a model colloidal suspension", *J. Chem. Phys.* **123**, 074707/1-5 (2005). (IF=2.843)
30. J. Delhommelle, P. T. Cummings and **J. Petravić**, "Conductivity of molten sodium chloride in an arbitrarily weak dc electric field", *J. Chem. Phys.* **123**, 114505/1-5 (2005). (IF=2.843)
31. **J. Petravic**, "Thermal conductivity of ethanol", *J. Chem. Phys.* **123**, 174503/1-7 (2005). (IF=2.843)
32. **J. Petravic** and P. Harrowell, "Linear response theory for thermal conductivity and viscosity in terms of boundary fluctuations", *Phys. Rev. E* **71**, 061201-1/6 (2005). "Erratum: Linear response theory for thermal conductivity and viscosity in terms of boundary fluctuations", *Phys. Rev. E* **74**, 049903 (2006). (IF=2.284)
33. **J. Petravic** and P. Harrowell, "The boundary fluctuation theory of transport coefficients in the linear response limit", *J. Chem. Phys.* **124**, 014103/1-6 (2006). (IF=2.843)
34. **J. Petravic** and P. Harrowell, "An equilibrium calculation of the thermal transport coefficients between two planes of arbitrary separation in a condensed phase", *J. Chem. Phys.* **124**, 044512/1-5 (2006). (IF=2.843)
35. **J. Petravic** and P. Harrowell, "Crystal-melt coexistence under shear: interpreting the nonlinear rheology", *J. Chem. Phys.* **125**, 124502 (2006). (IF=2.843)
36. **J. Petravic** and P. Harrowell, "On the equilibrium calculation of the friction coefficient for liquid slip against a wall", *J. Chem. Phys.* **127**, 174706/1-6 (2007). (IF=2.843)
37. **J. Petravic**, "Equivalence of nonequilibrium algorithms for simulations of planar Couette flow in confined fluids", *J. Chem. Phys.* **127**, 204702/1-7 (2007) (IF=2.843)
38. **J. Petravic** and P. Harrowell, "Equilibrium calculations of viscosity and thermal conductivity across a solid-liquid interface using boundary fluctuations", *J. Chem. Phys.* **128**, 194710/1-12 (2008). (IF=2.843)
39. **J. Petravic**, "Force autocorrelation function in linear response theory and the origins of friction", *J. Chem. Phys.* **129**, 094503/1-8 (2008). (IF=2.843)

40. **J. Petravic**, "Equilibrium calculation of friction coefficient for a massive particle moving in finite liquid volume", *J. Chem. Phys.* **129**, 114502/1-4 (2008). (IF=2.843)
41. W. G. Hoover, C. G. Hoover and **J. Petravic**, "Direct simulation of stationary nonequilibrium stress: Comparison of homogeneous Doll's and Sllod algorithms with boundary-driven shear", *Phys. Rev. E* **78**, 046701/1-14 (2008). (IF=2.284)
42. **J. Petravic** and P. Harrowell, "Spatial dependence of viscosity and thermal conductivity through a planar interface", *J. Phys. Chem. B* **113**, 2059-2065 (2009). (IF=3.146)
43. L. Loh, C. J. Batten, **J. Petravic**, M. P. Davenport and S. J. Kent, "In vivo fitness costs of different Gag CD8 T cell escape mutant simian-human immunodeficiency viruses in macaques", *J. Virol.* **81**, 5418-5422 (2007). (IF=4.368)
44. L. Loh, **J. Petravic**, C. J. Batten, M. P. Davenport and S. J. Kent, "Vaccination and timing influence SIV immune escape viral dynamics *in vivo*", *PLoS Pathogens*, **4**, e12 (2008). (IF=6.158)
45. **J. Petravic**, L. Loh, S. J. Kent and M. Davenport, "CD4+ target cell availability determines the dynamics of immune escape and reversion *in vivo*", *J. Virol.* **82**, 4091-4101 (2008). (IF=4.368)
46. **J. Petravic**, R. M. Ribeiro, D. R. Casimiro, J. Mattapallil, M. Roederer, J. Shiver, and M. P. Davenport, "Estimating the impact of vaccination in acute SHIV/SIV infection", *J. Virol.* **82**, 11589-11598 (2008). (IF=4.368)
47. M. P. Davenport, L. Loh, **J. Petravic** and S. J. Kent, "Rates of HIV immune escape and reversion: implications for vaccination", *Trends Microbiol.* **16**, 561-566, (2008). (IF=11.776)
48. L. Loh, J. C. Reece, C. S. Fernandez, S. Alcantara, R. Centre, J. Howard, D. F. J. Purcell, M. Balamurali, **J. Petravic**, M. P. Davenport and S. J. Kent, "Complexity of the inoculum determines the rate of reversion of CTL mutant virus and outcome of SIV infection", *PLoS Pathogens* **5**, e1000378 (2009). (IF=6.158)
49. M. D. H. Lay, **J. Petravic**, G. Silvestri and M. P. Davenport, "The gut is not the major source of virus in early SIV infection", *J. Virol.* **83**, p.7517-7523 (2009). **(featured in Spotlight)** (IF=4.368)
50. M. Davenport and **J. Petravic**, "CD8+ T cell control of HIV – a known unknown", *PLoS Pathogens* **6**, e1000728 (2010). (IF=6.158)
51. **J. Petravic**, "Killer T cells not so deadly in HIV", *Immunology & Cell Biology* **88**, 233-234 (2010).
52. P. Mrass, **J. Petravic**, M. P. Davenport and W. Weninger, "Cell-autonomous and environmental contributions to the interstitial migration of T cells", *Semin. Immunopathol.* **32**, 257-274 (2010). (IF=6.437)
53. L-M. Chan, **J. Petravic**, A. M. Ortiz, J. Engram, D. Cromer, G. Silvestri and M. P. Davenport, "Limited homeostatic CD4+ T cell proliferative response leads to preservation of CD4+ T cell counts in SIV infected Sooty Mangabeys", *Proc. Roy. Soc. B* **227**(1701), 3773-3781 (2010). (IF=4.94)
54. M. Balamurali, **J. Petravic**, L. Loh, S. Alcantara, S. J. Kent, and M. P. Davenport, "Does cytolysis by CD8+ T cells drive immune escape in HIV infection?", *J. Immunol.* **185**(9), 5093-5101 (2010). (IF=4.539)
55. J. C. Reece, L. Loh, S. Alcantara, C. S. Fernandez, J. Stambas, A. Sexton, R. De Rose, **J. Petravic**, M. P. Davenport, and S. J. Kent, "Timing of immune escape linked to success or failure of vaccination", *PLoS ONE*, **5**(9), e12774 (2010). (IF=2.766)
56. **J. Petravic** and M. P. Davenport, "Vaccination-induced noncytolytic effects in the acute phase of SHIV infection", *PLoS ONE*, **5**(11), e15083 (2010). (IF=2.766)

57. **J. Petravic** and M. P. Davenport, "Simian-human immunodeficiency infection - is the course set in the acute phase?", *PLoS ONE*, **6**(2), e17180 (2011). (IF=2.766)
58. J. Reece, **J. Petravic**, M. Balamurali, L. Loh, S. Gooneratne, R. De Rose, S. J. Kent and M. P. Davenport, "An "escape clock" for estimating the turnover of SIV DNA in resting CD4<sup>+</sup> T cells", *PLoS Pathogens* **8**(4), e1002615 (2012). (IF=6.158)
59. M. Pinkevych, **J. Petravic**, K. Chelimo, J. W. Kazura, A. M. Moormann and M. P. Davenport, "The Dynamics of Naturally Acquired Immunity to Plasmodium falciparum Infection", *PLoS Comput. Biol.* **8**(10), e1002729 (2012). (IF=3.955)
60. J. C. Reece, S. Alcantara, S. Gooneratne, S. Jegaskanda, T. Amaresena, C. S. Fernandez, K. Laurie, A. Hurt, S. L. O'Connor, M. Harris, **J. Petravic**, A. Martyushev, A. Grimm, M. P. Davenport, J. Stambas, R. De Rose, and S. J. Kent, "Trivalent Live Attenuated Influenza-Simian Immunodeficiency Virus Vaccines: Efficacy and Evolution of Cytotoxic T Lymphocyte Escape in Macaques", *J. Virol.* **87**(8) 4146-4160 (2013). (IF=4.368)
61. S. J. Kent, J. C. Reece, **J. Petravic**, A. Martyushev, M. Kramski, R. De Rose, D. A. Cooper, A. D. Kelleher, S. Emery, P. U. Cameron, S. R. Lewin, and M. P. Davenport, "The search for an HIV cure: tackling latent infection", *The Lancet Infectious Diseases* **13**(7), 614-621 (2013). (IF=25.148)
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65. **J. Petravic**, P. Ellenberg, M.-L. Chan, G. Paukovics, R. P. Smyth, J. Mak and Miles Davenport, "Intracellular dynamics of HIV infection", *J. Virol.* **88**(2): 1113-1124 (2014). (IF=4.368)
66. M. Pinkevych, **J. Petravic**, K. Chelimo, J. Vulule, J. W. Kazura, A. M. Moormann, and M. P. Davenport, "Decreased growth rate of P. falciparum blood stage parasitemia with age in a holoendemic population", *J. Infect. Dis.* **209**(7): 1136-1143 (2014). (IF=5.186)
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- cell kinetics rather than viral variability determines the timing of immune escape in SIV infection”, *J. Immunol.* **194**(9): 4112-4121 (2015). (IF=4.539)
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## II. Izvještaji i diskusijski članci

76. L. Prieto, V. Montañez, **J. Petravic**, I. Reporter, A. Medici, *Optimización de las Inversiones Para Respuesta al VIH en Perú*, The World Bank, Washington DC, 2017.
77. N. Calvo, F. Lavandez, I. Reporter, **J. Petravic**, C. Pantanelli, C. Lavandez, *Optimización de las Inversión en VIH/SIDA en Argentina*, The World Bank, Washington DC, 2017.
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## III. Poglavlja u knjigama

79. M. Gorgens, **J. Petravic**, D. J. Wilson and D. P. Wilson, *See the bigger picture: Resource Optimization Tools to Inform Health Benefit Package Design*, Chapter 10 in A. Glassman, U. Giedion and P. C. Smith (eds.): What’s in, what’s out: Designing benefits for universal health coverage, Center for Global Development, Washington DC 2017.