

Division of Mathematical and Physical Sciences	Research field	Multimedia Science	Lab. ID
			MP18
Laboratory web site	<a href="http://cmt.w3.kanazawa-u.ac.jp">http://cmt.w3.kanazawa-u.ac.jp</a>		
Research subjects			
<p>Research field of Multimedia Science consists of two groups: Condensed matter theory and chemical physics group (Shinichi Miura, Hiroshi Iwasaki) and Electronic structure and nonlinear dynamics group (Nobuaki Nishiyama, Kimikazu Sugimori).</p> <p><b>【Condensed matter theory and chemical physics】</b>  Microscopic properties of condensed matter systems ranging from superfluids to hydrated proteins are studied with extensive use of statistical mechanics, quantum mechanics and advanced molecular simulation techniques.</p> <p><b>【Electronic structure and nonlinear dynamics】</b>  (NISHIYAMA) Understanding and artificial controlling the functions of living cells as autonomous chemical systems are extremely required for the development of cell biology and medicine and mathematical modeling is recognized as a promising approach for such purposes. This research field is known as mathematical biology or system biology. Our laboratory currently focuses on the mathematical modeling of the process of cancer, especially leukemia, growth and metastasis. The outstanding point of our approach is the modeling based on the clinical data obtained from patients.  (SUGIMORI) To understand biological phenomena, based on quantum chemistry and electronic structure theory, we will study theoretical and computational method for biological molecular structure, property, and reaction. We treat molecular orbital and density functional theory by using molecular modeling.</p>			
Master/Doctor course: Education policy, curriculum, typical activity in the laboratory			
<p><b>【Condensed matter theory and chemical physics】</b>  We regularly have a group meeting every week. In the meeting, the speaker presents his latest research results and extensively discusses the scientific relevance of his results with all the group members. Also, an introductory seminar on molecular simulations, molecular dynamics and Monte Carlo methods, is scheduled for new comers.</p> <p><b>【Electronic structure and nonlinear dynamics】</b>  In our laboratory, learning outcomes through the research projects are to enhance your potential ability of critical thinking, defining problem, proposing hypothesis, evaluating potential solution, oral communication and so on. To attain the outcomes, you and laboratory staffs inquire daily each other why you should select the plans and the actions, leading to all member's logical thinking.</p>			
Daily life in the laboratory, etc.			
<p><b>【Condensed matter theory and chemical physics】</b>  Personal working desk with a personal computer is available for every student. Also, the workstations can be used for extensive numerical simulations. Laboratory activities include welcome party for new comers, excursion, BBQ, etc.</p> <p><b>【Electronic structure and nonlinear dynamics】</b>  You are required to construct time schedule for the research by yourself.</p>			
Message or comments by the laboratory faculty staffs			
<p><b>【Condensed matter theory and chemical physics】</b>  The method of molecular simulations are powerful theoretical tools to investigate the properties of many-body systems. The methods are versatile, and applications ranging from atoms to Galaxy. Let's join our research group to discover the frontier of the molecular simulations.</p> <p><b>【Electronic structure and nonlinear dynamics】</b>  (NISHIYAMA) System biology or mathematical biology is an interdisciplinary field and open to new comers familiar to experiments of cell biology or computational science. For experimentalists, we prepare educational programs concerned with statistics and the analysis of nonlinear dynamics within our laboratory.  (SUGIMORI) Biological science based on electronic structure theory requires scholarship of physics, chemistry, biology, and computational science broadly. We require you to have flexibility of crossing disciplines and to integrate a phenomenon by various point of view.</p>			
Recent Master theses in these 3 years (+ more if appropriate)			
year.month	Thesis title (including English translation of Japanese thesis title)		
2017.3	Free energy landscape of dipeptides in aqueous solutions using the integral equation theory of liquids		
2017.3	Development of a generalized hybrid Monte Carlo algorithm to generate the multicanonical distribution with applications to biomolecules		

2016.3	A variational path integral molecular dynamics study of protonated water clusters
2015.3	A theoretical study on structural fluctuation of a chignolin molecule by the 3D-RISM/MD hybrid simulation method
2013.9	A molecular dynamics study of structural fluctuation of a protonated water cluster
2013.3	A theoretical study on structure and fluctuation of the hydrogen hydrate
2012.3	A theoretical study on thermal and quantum structural fluctuation of protonated water clusters
Recent Doctoral theses in these 3 years (+ more if appropriate)	
year.month	Thesis title (including English translation of Japanese thesis title)
Laboratory mail address	<p><b>【Condensed matter theory and chemical physics】</b>  Shinichi Miura &lt;smiura *at* mail.kanazawa-u.ac.jp&gt;</p> <p><b>【Electronic structure and nonlinear dynamics】</b>  Nobuaki Nishiyama &lt;nnishiya *at* staff.kanazawa-u.ac.jp&gt;  Kimikazu Sugimori &lt;ksugimori *at* staff.kanazawa-u.ac.jp&gt;</p>