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Membership of academic societies:

The Mathematical Society of Japan

Research Interest:

- Quantum field theory
- Representation theory of infinite dimensional algebras
- Symmetric function

Research Summary:

H. Awata works in the areas of representation theory and quantum field theory, which involve the representation theory of infinite dimensional algebras such as Virasoro algebra, W algebra and affine Lie algebra and also involve the quantum field theories possessing one of these algebras as a symmetry such as super string theory, conformal field theory, two dimensional solvable model and topological field theory. Much of his work focuses on studying (q -deformed) Knizhnik-Zamolodchikov equation, Jack polynomial, Macdonald polynomial and Nekrasov's partition function. He is currently focusing on a study of the AGT conjecture, which reveals the relation between the conformal field theory and the Nekrasov's partition function.

Major Publications:

- [1] with Akihiro Tsuchiya and Yasuhiko Yamada, "Integral formulas for the WZNW correlation functions," Nuclear Physics **B365** (1991), 680–696.
- [2] with Satoru Odake and Jun'ichi Shiraishi, "Free Boson realization of $U_q(\widehat{sl}_N)$," Communications in Mathematical Physics **162** (1994), 61–83
- [3] with Masafumi Fukuma, Yutaka Matsuo and Satoru Odake, "Representation Theory of the $W_{1+\infty}$ Algebra," Progress of Theoretical Physics, Supplement **118** (1995), 343–373
- [4] with Harunobu Kubo, Satoru Odake and Jun'ichi Shiraishi, "Quantum W_N Algebras and Macdonald Polynomials," Communications in Mathematical Physics **179** (1996), 401–416
- [5] with Miao Li, Djordje Minic and Tamiaki Yoneya, "On the Quantization of Nambu Brackets," Journal of High Energy Physics 0102 (2001) 013
- [6] with Hiroaki Kanno, "Instanton counting, Macdonald function and the moduli space of D-branes," Journal of High Energy Physics 0505 (2005) 039.
- [7] with Yasuhiko Yamada, "Five-dimensional AGT Conjecture and the Deformed Virasoro Algebra," Journal of High Energy Physics 1001 (2010) 125.
- [8] with Boris Feigin and Jun'ichi Shiraishi, "Quantum Algebraic Approach to Refined Topological Vertex", Journal of High Energy Physics 1203 (2012) 041.

Education and Appointments:

- 1993 Soryushi-Syogakkai fellow at Yukawa Institute for Theoretical Physics, Kyoto University
- 1994 JSPS fellow at Research Institute for Mathematical Science, Kyoto University
- 1995 JSPS fellow at Yukawa Institute for Theoretical Physics, Kyoto University
- 1996 Visiting Scholar at Enrico Fermi and James Frank Institutes of Chicago University
- 1998 COE at Yukawa Institute for Theoretical Physics, Kyoto University
- 1999 Associate Professor at Graduate School of Mathematics, Nagoya University

Message to Prospective Students:

- The basic literature,
 - J. Polchinski, “String Theory”, Cambridge univ. press, 1998.
 - V. Kac, “Infinite dimensional Lie algebras”, Cambridge univ. press, 1990.
 - I.G. Macdonald, “Symmetric functions and Hall polynomials”, Second Edition, Oxford University Press, 1995.