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Membership of academic societies:
MSJ (Mathematical Society of Japan)

Research Interest:

- Various fields related to number theory (particularly **Arithmetic Geometry** and **Arithmetic Topology**):
  - **Motives and their p-adic realizations**: (mixed Tate) motives, (motivic) fundamental groups, (p-adic) (multiple) zeta functions, (p-adic) (multiple) polylogarithms, (p-adic) iterated integration theory, (p-adic) Knizhnik-Zamolodchikov equations, etc.
  - **Grothendieck's Teichmüller-Lego philosophy**: (absolute) (motivic) Galois group, configuration spaces, braided monoidal categories, (quasi-)Hopf algebras, etc.
  - **Quantum topology**: quantum groups, quantum invariants of knots and 3-manifolds, Kontsevich knot invariant, deformation quantizations, Kashiwara-Vergne conjecture, etc.

Research Summary:

My research is based on number theory. However it is not restricted to number theory, rather I am working on various fields related to number theory:

- **Arithmetic Geometry** is a part of number theory and **motive theory** is one of the most important theory in arithmetic geometry. Lots of people tend to regard that motive theory is a quite abstract and much general theory. But actually I am working oppositely on a very concrete side of motive theory, particularly on (p-adic) (multiple) zeta functions (p-adic) (multiple) polylogarithms and Knizhnik-Zamolodchikov equation. **Teichmüller-Lego philosophy** was posed by Grothendieck in his mysterious note 'Esquisse d'un programme' ('84). This philosophy is closely related to the above motive theory and also Drinfeld's subsequent works (in 80's) on quantum groups, where my research takes place. It has undergone a great interests due to appearance in different branches of mathematics, including motive theory, quantum group theory, deformation quantization theory, operad theory, analytic number theory, conformal field theory, differential geometry, low dimensional topology, mathematical physics, etc. It is one of the most exciting area to work today.
- **Arithmetic Topology** is a quite new area of mathematics, where I have started to work recently. It detects and purses several conceptual analogies between algebraic number theory and 3-dimensional topology (including **quantum topology**). One of the most impressive and advertising analogies might be the ones between primes and knots, which sound very mysterious and stimulating. Arithmetic topology is 'baby-like' because it has just started and is waiting to be developed. It is really a good time to get started pioneering works for younger generations like you!

Major Publications:

[1] H. Furusho, Double shuffle relation for associators, *Annals of Mathematics, Vol. 174 (2011), No. 1, 341-360.*

[2] H. Furusho, Pentagon and hexagon equations, *Annals of Mathematics, Vol. 171 (2010), No. 1, 545-556.*

[3] H. Furusho, p-adic multiple zeta values I – p-adic multiple polylogarithms and the p-adic KZ equation, *Inventiones Mathematicae, Volume 155, Number 2, 253-286, (2004).*

Awards and Prizes:

- 2014, Algebra Prize of Math. Soc. Japan.
- 2007, Inoue Research Award for Young Scientists.
- 2004, Takebe Prize of Math. Soc. Japan.

Education and Appointments:

2010- Now	Associate Professor at Nagoya University, Nagoya, Japan.
2007-2009	JSPS Postdoctoral Fellowships for Research Abroad in École Normale Supérieure, Paris, France.
2004-2005	Member at Institute for Advanced Study, Princeton, USA.
2004-2010	Assistant Professor at Nagoya University, Nagoya, Japan.
2003	Ph.D from RIMS, Kyoto, Japan.

Message to Prospective Students:

For undergraduate students; please be familiar with the standard techniques in number theory by reading J.P.Serre, "A Course in Arithmetic", *Graduate Texts in Mathematics, 67, Springer-Verlag.*

For master course students; it is necessary to learn several theories other than number theory if you want to work with me. The following books are my suggestions to read with me in the course.

- C.Kassel, "Quantum Groups", *Graduate Texts in Mathematics, 155. Springer-Verlag.*
- T.Ohtsuki, "Quantum Invariants", *Series on Knots and Everything, 29. World Scientific.*

But before you will contact with me, please decide by yourself the literatures which you want to read (other than the above mentioned books) during your master course and also be prepared to explain me your mathematical perspectives.

I also recommend you to read the following book by yourself

- M.Morishita, "Knots and primes", *Universitext. Springer, London, 2012.*

For doctor course students; the following are the paper which I like most. Make a challenge to read one of the following papers:

- P.Deligne, "Le groupe fondamental de la droite projective moins trois points", *Galois groups over Q, 79–297, Math. Sci. Res. Inst. Publ., 16, Springer, New York, (1989).*
- V.G.Drinfel'd, "On quasitriangular quasi-Hopf algebras and on a group that is closely connected with Gal($\overline{Q}/Q$)", *Leningrad Math. J. 2 (1991), no. 4, 829–860.*
- M. Kontsevich, "Operads and motives in deformation quantization", *Lett. Math. Phys. 48 (1999), no. 1, 35–72.*

Once you start to read, you will soon realized that it is really hard to read. But they are really enriched papers. I wish to educate perspective students for years to overcome them.

Good Luck!