Atoms' Theory via Examples

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Abstract

The purpose of this lecture series is to introduce the foundational concepts necessary to properly present the recent "Theory of Atoms" developed by Katzarkov, Kontsevich, Pantev, and Yu. Our approach will be example-driven: we aim for participants to gain hands-on familiarity with at least one illustrative example for each topic covered. Topics range from Gromov–Witten theory, Hertling–Manin manifolds, Gauss–Manin connections, nc-Hodge structures, orbifolds, Chen–Ruan cohomology, to atoms. References will be provided throughout the course.

All lectures will be held from 10:30 to 12:00 on Mondays and Wednesdays in the Room 222 (IMECC).

Lecture Schedule

Week	Date	Day	Topic
Week 1	May 12, 2025	Monday	Gromov–Witten theory for smooth projective varieties and the Quantum Connection
	May 14, 2025	Wednesday	Gromov–Witten theory for smooth projective varieties and the Quantum Connection
Week 2	May 19, 2025	Monday	Gauss–Manin connections and Hertling–Manin manifolds
	May 21, 2025	Wednesday	Gauss–Manin connections and Hertling–Manin manifolds
Week 3	May 26, 2025	Monday	More on Hertling–Manin manifolds and introduction to nc-Hodge structures
	May 28, 2025	Wednesday	More on Hertling–Manin manifolds and introduction to nc-Hodge structures
Week 4	June 2, 2025	Monday	nc-Hodge structures and basics on orbifolds
	June 4, 2025	Wednesday	nc-Hodge structures and basics on orbifolds

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Week	Date	Day	Topic
Week 5	June 9, 2025	Monday	Chen–Ruan cohomology and Gromov–Witten theory for orbifolds
	June 11, 2025	Wednesday	Chen–Ruan cohomology and Gromov–Witten theory for orbifolds
Week 6	June 16, 2025	Monday	Atoms
	June 18, 2025	Wednesday	Atoms