REFERENCES FOR MIT JUNE 2022 LECTURES

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Intro reading. References: [CdS, CG]. We will encounter a bunch of things from Symplectic geometry, some familiarity with them will be useful (some things will be explained in the lectures).

- Cotangent bundles: [CdS, Section 2], [CG, Section 1.1].
- moment maps: [CdS, Chapter VIII], [CG, Section 1.4].
- Poisson structures: [CdS, Section 18], [CG, Sections 1.2,1.3].
- Hamiltonian reduction: [CdS, Chapter IX]. There are also various notes, please ask for details.

Nilpotent orbits. These will be discussed in lectures in detail. The main references are [CM] and [CG, Sections 3.1-3.3, 3.7].

Symplectic singularities, etc. This is one of primary objects of study for the course. Symplectic singularities were introduced in [B]. For symplectic resolutions and their quantizations, see [BPW] or [L1]. These papers also contain references to the previous work, e.g., by the work of Namikawa on singular symplectic varieties.

Harish-Chandra (bi)modules. This is the second primary subject for the course. The classical theory of Harish-Chandra modules is explained in a number of monographs, such as [V1] or [V2]. What we will be discussing is an approach to Harish-Chandra bimodules based on the quantizations of symplectic singularities, the main references are [L2, LMBM].

Miscellaneous. To be completed.

REFERENCES

[B]   A. Beauville, *Symplectic singularities.* Invent. Math. 139 (2000), no. 3, 541–549.

[BPW] T. Braden, N. Proudfoot, B. Webster, *Quantizations of conical symplectic resolutions I: local and global structure.* Astérisque No. 384 (2016), 1–73. arXiv:1208.3863.

[CdS] A. Cannas da Silva, *Lectures on Symplectic geometry.* Available at this link.

[CG] N. Chriss, V. Ginzburg, *Representation theory and Complex geometry.* Birkhauser Boston, Inc., Boston, MA, 1997. x+495 pp.

[CM] D. Collingwood, W. McGovern, *Nilpotent orbits in semisimple Lie algebras.* Van Nostrand Reinhold Mathematics Series. Van Nostrand Reinhold Co., New York, 1993.

[L1] I. Losev, *Deformations of symplectic singularities and orbit method for semisimple Lie algebras.* Selecta Math. (N.S.) 28 (2022), no. 2, Paper No. 30, 52 pp. arXiv:1605.00592.

[L2] I. Losev, *Harish-Chandra bimodules over quantized symplectic singularities.* Transform. Groups 26 (2021), no. 2, 565–600. arXiv:1810.07625.

[LMBM] I. Losev, L. Mason-Brown, D. Matvieievskyi, *Unipotent Ideals and Harish-Chandra Bimodules.* arXiv:2108.03453.

[V1] D. Vogan, *Representations of real reductive Lie groups.* Progress in Mathematics, 15. Birkhäuser, Boston, Mass., 1981.

[V2] D. Vogan, *Unitary representations of reductive Lie groups.* Annals of Mathematics Studies, 118. Princeton University Press, Princeton, NJ, 1987.