MONOPOLE MODULI

Bengaluru, September 14–25, 2026

The Virtual Booklet

ICTS | International Centre for Theoretical Sciences
TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Minicourses

Andrea Ferrari (DESY, Germany)

Berry phases in supersymmetric QFT, periodic monopoles and generalised cohomology

Tue 15 11:30, Wed 16 11:30, Thu 17 14:00, Fri 18 11:30

I will start by introducing the notion of Berry connection in quantum mechanics and quantum field theory — a connection on a vector bundle of ground states fibering over deformation parameters. Then I shall explain that 2d supersymmetric theories quantised on a circle and endowed with a symmetry have Berry connections which are generalised periodic monopoles. As we will see, when these theories can be defined as sigma-models with Kähler manifolds as target, physical observables (such as the ground states) are related to (generalised) cohomology theories of these target manifolds. I will conclude this series of lectures by discussing two different kinds of spectral data of generalised periodic monopoles and, for Berry connections arising from sigma-models, by finally relating these data to the geometry of the target manifold.

Lorenzo Foscolo (University of Rome I "La Sapienza", Italy)

Hypertoric geometry of Coulomb branches

Tue 15 15:00, Wed 16 15:00, Thu 17 15:00, Fri 10 9:00

We shall discuss construction and classification results for complete non-compact hyperkähler manifolds. We will focus on manifolds that admit an asymptotic geometry that generalises to higher dimensions the one of 4-dimensional ALF gravitational instantons such as the Taub–NUT and the Atiyah–Hitchin metrics. The 4-dimensional gravitational instantons have been recently classified and a relevant role in this theory is played by the Gibbons–Hawking ansatz, which allows one to describe 4-dimensional hyperkähler metrics with a circle symmetry explicitly. In higher dimensions, results are much more sporadic. In the minicourse we will discuss the role of higher dimensional generalisations of the Gibbons–Hawking ansatz, which can be used to construct examples with a torus symmetry, the so-called hypertoric varieties. We will also examine known examples arising from moduli spaces in gauge theory, such as monopoles, solutions to Nahm's equations and moduli spaces of instantons on ALF spaces. Finally, we will discuss how a large class of examples is expected to arise from Coulomb branches of 3-dimensional quantum gauge theory in theoretical physics.

Derek Harland (University of Leeds, UK)

L^2 geometry of hyperbolic monopole moduli

Tue 15 9:00, Wed 16 9:00, Thu 17 11:30, Fri 18 14:00

This minicourse introduces BPS monopoles on Euclidean space and hyperbolic space, and discusses their L^2 geometry. Monopoles are examples of topological solitons with origins in particle physics. The L^2 metrics on their moduli spaces can be used to study dynamics and are also geometrically interesting in their own right. This course will introduce some remarkable tools that can be used to construct monopoles, such as rational maps, spectral curves, and the Nahm transform. It will then review the L^2 geometry of Euclidean monopoles, before looking at some recent work on the L^2 geometry of hyperbolic monopoles.

Siqi He (Morningside Center of Mathematics, China)

The extended Bogomolny equation, Higgs bundles, and the Kobayashi–Hitchin correspondence

Tue 15 10:30, Wed 16 10:30, Thu 17 10:30, Fri 18 10:30 (online)

In this minicourse, we discuss the extended Bogomolny equations and their relation to Higgs bundles and the Kobayashi–Hitchin correspondence. These equations arise naturally as a dimensional reduction of the Kapustin–Witten equations and provide a bridge between gauge theory, complex geometry, and low-dimensional topology. We begin with a review of Higgs bundles on Riemann surfaces and the classical Kobayashi–Hitchin correspondence, which identifies stable Higgs bundles with solutions to Hitchin's equations. We then introduce the extended Bogomolny equations on three-manifolds with boundary, emphasizing their geometric meaning and analytic structure. A central theme of the course is to explain how solutions to the extended Bogomolny equations can be interpreted in terms of holomorphic data, and how a version of the Kobayashi–Hitchin correspondence extends to this setting. We will also discuss boundary conditions, singular solutions, and their role in recent developments in gauge theory.

Chris Kottke (Rutgers University, USA)

Analytical aspects of monopole moduli spaces

Tue 15 14:00, Wed 16 14:00, Thu 17 9:00 and 16:30

In this minicourse we will consider the asymptotic geometry of the L^2 metrics on the moduli spaces of Euclidean BPS monopoles, emphasizing their "quasi-fibered-boundary" (QFB) structure. This QFB structure encodes a hierarchy of asymptotic regions of the moduli space, associated to cluster decompositions of monopoles with fixed charge into widely separated monopoles of lower charge. Accordingly, the metric admits asymptotics involving the metrics of lower charge moduli spaces. We will then discuss some implications for the analysis of harmonic forms on QFB manifolds with an eye toward Sen's conjecture for the L^2 Hodge theory of monopole moduli spaces.

Outreach Activity

On Wednesday 16th our program hosts an outreach session titled **The Physics of Magnetic Monopoles**, starting at 16:30 (approx. duration: 75 minutes) and featuring two invited speakers:

- Prof. Arttu Rajantie, a member of the MoEDAL experiment searching for magnetic monopoles produced in proton-proton and heavy-ion collisions at the Large Hadron Collider (LHC), the world's most powerful particle accelerator located at CERN, Geneva (Switzerland);
- Dr Max Bachmaier, a recent graduate from the Max Planck Institute for Physics, Garching (Germany); he has been involved in a collaboration studying the scattering of magnetic monopoles via numerical simulation of their field theory models, generating sophisticated computer animations of collision events.

Arttu Rajantie (Imperial College, London, UK)

Magnetic monopoles: where are they?

Wed 16 16:30

Magnetic monopoles are among the most compelling predictions of theoretical physics, yet no convincing evidence for their existence has been found. In many ways, they are unlike any other hypothetical particle, with important implications for how they can be produced and detected. I will review the broad range of search strategies that have been pursued, from indirect astrophysical constraints to direct searches in cosmic rays and collider experiments. Particular emphasis will be placed on recent LHC searches based on the electromagnetic dual of the Schwinger pair-production mechanism, which provides a theoretically controlled framework for monopole production in strong electromagnetic fields. I will conclude by discussing the future prospects for monopole searches and the implications of a discovery for fundamental physics.

Max Bachmaier (EHU, Bilbao, Spain)

Magnetic monopoles: how do they collide?

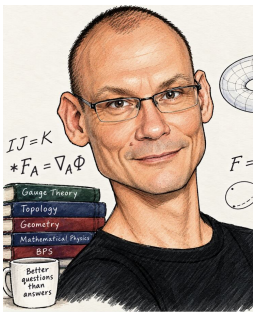
Wed 16 17:15

The topological structure of magnetic monopoles (originally uncovered by 't Hooft and Polyakov) has remarkable consequences on their collisions; Manton suggested that their dynamics may be understood as motion through a geometric "moduli space" of all static monopole configurations of minimal energy compatible with such structure. In the mid-1980s, this proposal led Atiyah and Hitchin to construct the moduli space of two monopoles and to show that, in a head-on collision, two monopoles scatter at a right angle. Since then, a variety of monopole scattering processes has been explored. Advances in computational power and numerical techniques now allow us to simulate these scenarios directly. In this talk, I will explain the origin of right-angle scattering using simple illustrations and animations. I will then present the first fully field-theoretic simulations of magnetic monopole collisions, which provide a precise numerical test of the predictions that were based on the moduli space approach.

We dedicate this special session to Prof. Nigel Hitchin and Prof. Gerard 't Hooft, to commemorate their 80th birthdays earlier this Summer.

Keynote Lectures

Roger Bielawski (Leibniz University of Hanover, Germany)



Quasimonopoles and the asymptotics of monopole metrics

Mon 21 10:30, Tue 22 10:30

I shall introduce and discuss moduli spaces of quasimonopoles — hyperkähler manifolds which approximate the SU(2)-monopole metric with exponential accuracy in appropriate asymptotic regions, and possess a torus symmetry required in the Segal–Selby approach to the Sen conjecture. This is joint work with Sergey Cherkis and Jacques Hurtubise.

Cliff Taubes (Harvard University, USA)

Analysis for the Vafa–Witten equations

Thu 24 16:30, Fri 25 16:30 (online)

I plan to explain and illustrate some of the salient analysis issues with regards to potential use of Vafa–Witten equation solutions to define smooth invariants for 4-dimensional manifolds. As it turns out, most of iconic gauge theory plays a role in the story: Bogolmony monopoles on $\mathbb{R}^3$, anti-self dual instantons on $\mathbb{R}^4$, flat $\mathrm{SL}(2;\mathbb{C})$ connections on Riemann surfaces, and then some novelties ($\mathbb{Z}/2$ harmonic differential forms).

Research Talks

Aswin Balasubramanian (Chanakya University, India)

Class S theories and the geometric Langlands correspondence

Wed 23 15:00

I will describe a physical way to think about the geometric Langlands correspondence using a class of 4d $\mathcal{N} = 2$ theories (called class S theories). This point of view can be taken to be complementary to the approach of Kapustin–Witten and clarifies how their approach is related to the one based on 2d conformal field theories. The Hitchin integrable system plays a critical role in many of these considerations, so the talk can alternatively be thought of as an exploration of the geometry of the Hitchin system from various perspectives.

Indranil Biswas (Shiv Nadar University, India)

Monopoles on Sasakian three-manifolds

Mon 21 11:30

We consider monopoles with singularities of Dirac type on quasiregular Sasakian three-manifolds fibering over a compact Riemann surface X, for example the Hopf fibration. We show that these correspond to holomorphic objects on X, which we call twisted bundle triples. These are somewhat similar to Murray's bundle gerbes. A spectral curve construction allows us to classify these structures, and, conjecturally, monopoles.
Joint work with Jacques Hurtubise.

Facundo Camano (University of Waterloo, Canada)

Monopolization of tesserons

Thu 24 10:30

Monopolization is a conjecture by Sergey Cherkis stating that all tesserons (hyperkähler gravitational instantons) may be realized as monopole moduli spaces. In the first half of the talk, we will go over the motivation for the conjecture, which tesserons have already been realized as monopole moduli spaces, the idea that all tesserons are related via Gromov–Hausdorff limits, and the moduli spaces proposed for the remaining tesserons. In the second half of the talk, I will present recent work investigating a particular Gromov–Hausdorff limit of moduli spaces of singular monopoles on $\mathbb{R}^3$.

Benoit Charbonneau (University of Waterloo, Canada)

Monopoles with arbitrary symmetry breaking: some further musings

Mon 21 14:00

The theory of SU(n)-monopoles is at its most developed in the case of maximal symmetry breaking. By contrast, monopoles with repeated Higgs-field eigenvalues inhabit a considerably rougher landscape. In this setting, familiar tools often require substantial reformulation: for instance, spectral curves alone do not determine the monopole, and the corresponding Nahm data exhibits phenomena with no analogue in the maximally broken case. I will explore several routes through this landscape, drawing on both classical constructions and more recent developments. Some of these paths are well travelled, while others remain only partially charted. The goal of the talk is not to present a definitive theory, but rather to offer a snapshot of a subject in development and to highlight some of the challenges that remain.

Aradhita Chattopadhyaya (CMI Siruseri, India)

Vafa–Witten theory and mock modularity

Fri 25 15:00

I will review aspects of Witten and Vafa's 1994 work on S-duality. This is a supersymmetric, topologically twisted version of Yang–Mills theory on a 4-manifold M. In this talk I will focus on $M = \mathbb{CP}^2$ and gauge group SU(N). The instanton partition functions in this theory are given in terms of mock modular forms. I will also discuss my recent work with Jan Manschot, where we proved the structure of holomorphic anomaly as predicted in the original paper of Vafa and Witten. If time permits, I will briefly discuss my recent paper with Sergey Alexandrov where we comment on these invariants on the walls of marginal stability.

Josh Cork (University of Leicester, UK)

Rotating calorons and delayed Nahm equations

Thu 24 11:30

Rotating calorons are screw-symmetric anti-self-dual connections on $\mathbb{R}^4$, that is, instantons invariant under a glide rotation. In this talk, after a brief review of ordinary calorons (periodic instantons) and their relationship with monopoles, we shall formulate a Nahm transform for rotating calorons, identifying them with solutions of integrable delay-differential equations. These equations generalise the classical Nahm equations, and exhibit new phenomena such as non-constant rank 1 solutions. We shall describe these solutions in the simplest non-trivial case, and discuss some new directions and open problems.

Justin David (IISc, India)

Dyonic black holes in $\mathcal{N} = 4$ string theory and modular forms

Fri 25 14:00

We review the counting of the degeneracy of BPS states carrying electric and magnetic charges in $\mathcal{N} = 4$ string theories. We consider states which preserve either half or quarter of the supersymmetries of the theory. For large charges, these states can be identified as extremal black holes. We discuss how modular forms transforming under $\mathrm{SL}(2,\mathbb{Z})$ and $\mathrm{Sp}(2,\mathbb{Z})$ appear as partition functions from which the BPS degeneracy can be extracted. We then show how properties of modular forms can be used to obtain the Hawking–Beckenstein entropy of the corresponding black hole. Surprisingly, recent studies have shown that properties of black holes can be used to predict certain positivity properties of the Fourier coefficients of the modular forms.

Daniel Fadel (University of São Paulo, Brazil)

Monopoles at large mass: concentration and abelianization

Wed 24 11:30

I will discuss the large mass behaviour of SU(2) monopoles on asymptotically conical manifolds in dimensions three, six, and seven. In dimension three, corrected and expanded joint work with Gonçalo Oliveira shows that the mass-normalized energy concentrates at finitely many points, which coincide with the limiting Higgs-zero set. Each point carries a finite cluster of mass-one Euclidean monopoles whose total charge determines the concentration weight. In subsequent work, I prove exponential abelianization away from the concentration set and convergence, after translating the Higgs fields by their masses, to a reducible monopole with Dirac singularities. I will then turn to joint work with Gonçalo Oliveira on G_2 and Calabi–Yau monopoles with fixed asymptotic monopole class. We place the complementary compactness theories of Parise–Pigati–Stern and Yang Li in a unified asymptotically conical framework and identify the limiting currents they produce; this single current is a compactly supported calibrated integral cycle governing the mass-normalized energy concentration. Taking this cycle as our starting point, our main results compare its support with the limiting Higgs-zero set and with a limiting nonabelian locus defined from Li's curvature concentration sets. We identify the excess of the nonabelian locus over the calibrated support with the obstruction to effective codimension-three monotonicity and prove abelianization away from the nonabelian locus.

Guido Franchetti (University of Pisa, Italy)

The L^2 metric for hyperbolic 2-monopoles

Tue 22 14:00

While it has been known for a long time that the L^2 metric on the moduli space of hyperbolic monopoles is divergent, it has been recently shown that it can be made finite by modifying the gauge fixing condition. In this talk, based on joint work with Derek Harland, I will show how applying the modified gauge fixing condition to the moduli space of charge 2 mass 1/2 monopoles results in a complex non-degenerate bilinear form which can be explicitly computed. This bilinear form restricts to a Riemannian metric on the subspace of inversion-symmetric 2-monopoles.

Tom Galvin (University of Leeds, UK)

A new metric for hyperbolic SU(2) 2-monopoles

Tue 22 13:00

There is significant interest in the L^2 metric on the moduli space of SU(2) Euclidean monopoles, both because it is hyperkähler, and because it models monopole dynamics. No direct analogue of such a metric exists for hyperbolic monopoles, though alternatives have been suggested. I will discuss a new metric on the moduli space of hyperbolic SU(2) 2-monopoles based on methods of O. Nash. While this metric is not hyperkähler, it does possess a more general geometry known as a pluricomplex structure. I will introduce this concept in the talk before examining some of the metric's curvature properties. This is joint work with Derek Harland and Linden Disney-Hogg.

Amihay Hanany (Imperial College, UK)

Quotient quiver subtraction and the moduli space of monopoles

Fri 25 10:30

The moduli spaces of classical BPS monopoles on $\mathbb{R}^3$ — together with variants carrying singular framing or non-trivial asymptotic boundary conditions — are complete hyperkähler manifolds with an underlying integrable structure. In the physics description, these same spaces arise as Coulomb branches of 3d $\mathcal{N} = 4$ quiver gauge theories: each monopole moduli space is encoded combinatorially by a quiver, a graph whose nodes and edges record gauge and matter content. This dictionary is powerful, but computing explicit metrics — or evaluating hyperkähler quotients by isometry subgroups — remains difficult once the group action fails to be free and singular loci appear. In this talk we introduce quotient quiver subtraction, a graph-theoretic algorithm that performs SU(n) hyperkähler quotients directly on the quiver associated to a monopole moduli space, without first knowing an explicit metric. Rather than assuming the quotient is a smooth geometric slice, the procedure handles singular group actions by producing a finite set of resulting quivers, whose Coulomb branches together reconstruct the metric and global structure of the quotient. We illustrate the method on quivers built from finite A_4-type root systems — that is, linear-chain quiver diagrams.

Christopher Lang (Memorial University, Canada)

Monopoles, co-Higgs bundles, and topological recursion

Tue 22 9:00

In this talk, we discuss the relationship between the moduli spaces of SU(2) monopoles and stable co-Higgs bundles. We focus on charge two monopoles, showing that the normal bundle of the monopole moduli space in the Hitchin base carries a natural metric, which can be described using topological recursion. This talk is based on ongoing joint work with Linden Disney-Hogg.

Yang Li (University of Cambridge, UK)

Large mass limit of G_2 and Calabi–Yau monopoles

Wed 23 10:30 (online)

I will discuss some recent progress on the Donaldson–Segal programme, which concerns the limiting behaviour of gauge theory equations known as G_2-monopoles (resp. Calabi–Yau monopoles) on asymptotically conical G_2-manifolds (resp. Calabi–Yau 3-folds). We develop a structure theory for the limit of SU(2) G_2-monopoles (resp. Calabi–Yau monopoles) as the mass parameter tends to infinity, while the topological data for the bundle stays fixed. We show how to extract a singular abelian G_2-monopole (resp. Calabi–Yau monopole) with Dirac singularity along a calibrated cycle in the large mass limit, and we prove an energy identity for monopole bubbles.

Richard Melrose (MIT, USA)

TBA

Tue 22 16:30 (online)

TBA

Pranav Pandit (ICTS, India)

Kähler geometry of categories

X Thu 24 10:30

A Bridgeland stability condition may be thought of as a categorical analogue of a Kähler class. I will discuss the problem of refining it to a notion of Kähler metric, with corresponding notions of mass, harmonic objects, minimizing flows, and a Kobayashi–Hitchin-type picture. Part of the framework I will describe is closely related to a noncommutative-geometric formalism encompassing, among other examples, the Bogomolny equations.
Joint work with F. Haiden, L. Katzarkov, and M. Kontsevich.

Frédéric Rochon (UQÀM, Canada)

Geometry at infinity of the moduli space of centered monopoles of type $(1, \ldots, 1)$

Mon 21 15:00

The moduli space of centered monopoles of type $(1, \ldots, 1)$ is a Taub–NUT deformation of maximal order of the Euclidean metric. We will use this fact to show that the natural metric on the moduli space is a quasi-fibered boundary metric. This will allow us to identify the tangent cone at infinity, to compute the reduced L^2-cohomology and to prove that Sen's S-duality conjecture holds for centered monopoles of type $(1, \ldots, 1)$.

Andy Royston (University of , USA)

Interfaces and boundaries for the extended Bogomolny equations: a holographic perspective

Fri 25 11:30

I review my work with Sophia Domokos over the past eight years exploring aspects of the intersecting D3/D5 system in string theory. This system gives rise to a form of the holographic correspondence known as AdS/dCFT. We find that the extended Bogomolny equations (EBEs) play a role in the description of BPS states on both sides of the correspondence. On one side, the EBEs are defined on $\mathbb{R}^3$ with an $\mathbb{R}^2$ interface on which jumping data lives. On the other side, the EBEs are defined on a Euclidean half-space $\mathbb{R}^2 \times [0, \infty)$. The holographic correspondence implies relationships for each of these systems to others that may be of interest. I describe our work in progress towards understanding these relationships.

Filippo Sotgiu (University of Rome I "La Sapienza", Italy)

Instantons on the Atiyah–Hitchin manifold

Wed 23 9:00

We construct SU(2)-instantons on the Atiyah–Hitchin manifold as superpositions of "fundamental constituents". We classify the admissible boundary conditions and predict the dimension of the moduli space for each one. The constituents are the monopoles and "rotated monopoles" already studied in the case of $\mathbb{R}^3 \times S^1$ by Foscolo and Ross, plus a rigid, SO(3)-invariant instanton which is specific to the Atiyah–Hitchin manifold. We explain how this result can be used as a stepping stone towards the construction of large families of Yang–Mills instantons over all ALF hyperkähler manifolds from similar constituents.
This talk is based on joint work with Lorenzo Foscolo, Calum Ross and Jakob Stein.

Weifeng Sun (Tsingua University, China)

Gauge theory with knot singularities

Thu 24 15:00 (online)

Singular solutions of gauge-theoretic equations provide a bridge between geometric analysis and knot theory. I will begin with a brief introduction to Kronheimer–Mrowka's construction of instanton Floer homology for knots. Motivated by this picture, I will discuss several other gauge theories with singularities that may have connections to knot theory. One example is the Bogomolny equation on $\mathbb{R}^3$ with singularities along a knot. I will describe my work on local singularity models and the analysis of the associated moduli spaces. Another direction is Witten's proposal to recover the Jones polynomial and Khovanov homology through gauge theory. I will explain this proposal and how it leads to the extended Bogomolny equations.

Arya Yae (University of Oregon, USA)

Metric convergence from parabolic Higgs bundle moduli spaces to hyperpolygon spaces

Fri 25 9:00 (online)

The moduli space of parabolic Higgs bundles on a Riemann sphere with n marked points is a hyperkähler manifold with a rich geometric structure. Points in the moduli space correspond to solutions to Hitchin's equations, which arise via dimensional reduction of the Yang–Mills equations. These solutions are generally very hard to find, and we cannot describe the moduli space metric explicitly. Thus, in order to prove geometric results, we rely on gauge-theoretic techniques. We show that under a fine-tuned degeneration of the moduli parameters, the hyperkähler metric on the moduli space converges pointwise to that of an embedded Nakajima quiver variety called hyperpolygon space. The proof uses a construction of model solutions to Hitchin's equations near the marked points, a delicate gluing procedure, and an application of the analytic implicit function theorem in the degenerate limit to perturb the approximate solution to an actual solution.
This talk is based on my recent paper `arXiv:2601.10656` with Laura Fredrickson.

Jiajun Yan (Rice University, USA)

A gauge-theoretic construction of the 4-cimensional hyperkähler ALE spaces

Thu 24 9:00 (online)

Non-compact hyperkähler spaces arise frequently in gauge theory. The 4-dimensional hyperkähler ALE spaces are a special class of complete non-compact hyperkähler spaces. They are in one-to-one correspondence with the finite subgroups of SU(2) and have interesting connections with representation theory and singularity theory, captured by the McKay correspondence. In this talk, we give a gauge-theoretic construction of these spaces, inspired by Kronheimer's original construction via a finite-dimensional hyperkähler reduction. In the gauge-theoretic construction, we realize each ALE space as a moduli space of solutions to a system of equations for a pair consisting of a connection and a section of a vector bundle over an orbifold Riemann surface, modulo a hyperkähler gauge group action.

Yehao Zhou (SIMIS, China)

Generalized chiral Potts models and hyperbolic monopoles from holomorphic-topological Chern–Simons theories

Tue 22 11:30 (online)

The chiral Potts model is an integrable model which is exceptional in the sense that its spectral parameter lives on a surface of genus greater than one. Atiyah observed that the same spectral data appear in the study of SU(2) hyperbolic monopoles. In this talk, I will revisit and generalize the correspondence and explore the origin of the correspondence in the holomorphic-topological Chern–Simons theories.
This talk is based on joint work `arXiv:2502.17545` with Moosavian and Yamazaki.

Schedule

Please note that Monday 14th is a local religious holiday (Ganesha Chaturthi), with no lectures.

The program will adopt the following daily schedule throughout the two weeks, from Tuesday 15th:

07:30–09:00	breakfast (served at the cafeteria)
09:00–09:50	lecture slot 1
10:00–10:30	morning coffee/tea break (served by the lecture halll)
10:30–11:20	lecture slot 2
11:30–12:20	lecture slot 3
12:30–14:00	lunch (served upstairs at the cafeteria)
14:00–14:50	lecture slot 4
15:00–15:50	lecture slot 5
16:00–16:30	evening tea/snack (served by the lecture hall)
16:30–17:20	lecture/discussion slot 6
19:00–21:00	dinner (served at the cafeteria)

The assignment of slots will be as follows.

Week 1: *Minicourses and outreach session*

Slots	Monday 14	Tuesday 15	Wednesday 16	Thursday 17	Friday 18
1	tea	Harland I	Harland II	Kottke III	Foscolo IV
2		He I	He II	He III	He IV
3		Ferrari I	Ferrari II	Harland III	Ferrari IV
4		Kottke I	Kottke II	Ferrari III	Harland IV
5		Foscolo I	Foscolo II	Foscolo III	
6		check-in class	Rajantie + Bachmaier	Kottke IV	

Additional events:

Mon 14, 09:00	Arrival tea and informal welcome by the Organisers
Tue 15, 16:30	Check-in class (for the more junior participants)
Wed 16, 16:30	Outreach session — *The Physics of Magnetic Monopoles*
Mon 21, 09:00	Official welcome session by ICTS Director Prof. Rajesh Gopakumar
Mon 21, 16:30	Thematic discussion 1) *S-duality: then and now*
Wed 23, 16:30	Thematic discussion 2) *AI: a new era for gauge theory?*

Week 2: *Keynote lectures and research talks*

Slots	Monday 21	Tuesday 22	Wednesday 23	Thursday 24	Friday 25
1	welcome	Lang	Sotgiu	Yan	Yae
2	Bielawski I	Bielawski II	Li	Camano	Hanany
3	Biswas	Zhou	Fadel	Cork	Royston
4	Charbonneau	Franchetti	Pandit	Parise	David
5	Rochon	Galvin	Balasubramanian	Sun	Chattopadhyaya
6	discussion 1)	Melrose	discussion 2)	Taubes I	Taubes II

Exploring Bangalore

The city of Bangalore has made its reputation for other reasons than being an obvious tourist destination, but it is nonetheless worth exploring for some colonial architecture, parklands and art galleries — as well as for shopping. Such an outing is straightforward to organise: you can just take advantage of the free shuttle connecting ICTS with IISc, another research institute in a more central location, and then perhaps move forward by cab/auto-rickshaw or using the Metro, which is easy to navigate.

The local holiday on Monday 14th (officially the first day of our program!) marks **Ganesha Chaturthi**, a vibrant religious festival honouring the elephant-headed Lord Ganesha, the revered overcomer of troubles. While major Ganesha-centric shrines — like the mammoth Sri Dodda Ganapathi temple in Basavanagudi — will be massively overcrowded with hours-long ritual queues, the day can offer a fascinating window into local culture. A uniquely Bangalore curiosity is the small Sri Prasanna Ganapati temple in Koramangala, famously dubbed the "techie Ganesha" because local students, software professionals and startup founders flock there specifically to pray for job offers, promotions, and exam or corporate success. If you are interested in observing the festive ceremonies without the overwhelming holiday rush, a smart option is to visit one of the city's other historic, non-Ganesha temples, most of which house their own smaller Ganesha shrines. One example is the Sri Dakshinamukha Nandi Tirtha in nearby Malleshwaram, part of a scenic cluster of temples accessible by a 5-minute auto-rickshaw ride from IISc. This unique Shiva temple was buried underground for centuries and only rediscovered during an excavation in 1997; it features a mysterious, continuous stream of fresh water flowing from the mouth of a stone Nandi bull directly onto a shivalinga, collecting in a stepped stone pool filled with turtles and fish. It remains a serene, low-key oasis even on major public holidays. After exploring this temple, you can head just up the road to Sankey tank, a sprawling man-made lake surrounded by lush greenery. Alternatively, if you prefer to avoid the city rush altogether, you could just venture into one of the villages surrounding the ICTS campus to experience traditional, community-led decorations and music in a much calmer, rural atmosphere.

If you are thinking of visiting museums and galleries, note that the local Government Museum is currently closed for a massive renovation and curation upgrade. Most trending right now is the Museum of Art & Photography (MAP), a private institution showcasing Indian art and culture, both traditional and modern. (Note that it is closed on Mondays, so it is not an option for your holiday plans.) It regularly hosts a number of parallel exhibitions, with a strong focus on contemporary artists and leveraging digital technology. If you cannot visit in person (perhaps because you are attending our program remotely!), we still encourage you to have a virtual tour of the collection on their well-developed website: `https://map-india.org/`

Weekend: Suggestions

S^3 expedition: Sravanabelagola, Srirangapatna and Somnathpur

On Saturday 19th we will organise a bus tour to a small number of cultural sites in Karnataka. Please note that this is a full-day programme, requiring departure from ICTS at 6:00 am sharp!

We will head first to Sravanabelagola (arrival around 7:30 am, a good time for a packed breakfast — please bring your own; fresh fruit is available there from local vendors) to explore two historic hills, Indragiri and Chandragiri, steeped in over two millennia of Jain tradition. Climbing 700 granite steps barefoot up Indragiri rewards you with a close view of the Gommateshwara statue, a magnificent 10th-century monolith and one of the largest free-standing sculptures in the world. Chandragiri holds a walled complex of 14 Jain shrines, mostly in Dravidian style.

Our next stop will be Srirangapatna, a historic fortified island serving as local capital at various times. Located near the ancient Sri Ranganathaswamy Vishnu temple (which we will visit), the city is famously known as the stronghold where Tipu Sultan, with some French assistance, staged his late 18th-century resistance against British conquest. We shall tour Tipu's Summer Palace to admire its stunning wooden architecture and colorful murals depicting grand battle scenes.

We will next head to Somnathpur to visit its Keshava temple, built in the mid-13th century in the ornate Hoysala architectural style that Southern Karnataka is famous for. The building is no longer in active religious use, but it is considered to be the best-preserved of three Hoysala temples (the others are at Belur and Halebid) that are now jointly listed as a UNESCO World Heritage Site.

On the way back to ICTS, we will stop at the popular Empire Restaurant near Maddur for a hearty North Indian and Mughlai dinner — our main meal of the day.

The deadline for signing up is 16:00 on Thursday 17th; to sign up, you must join the public channel #`s3-expedition` on our Slack workspace. Rough estimated cost per person: ₹1,000 (dinner and entry tickets not included). A more accurate estimate will be provided around 14:00 on Thursday 17th. Please pay your booking to Nuno Romão in cash by Friday 18th evening.

Hampi adventure

Hampi is the name given today to the village next to the ruins of the once great city of Vijayanagara, the capital of a vast empire controlling most of Southern India and marking the golden age of medieval Hindu civilization. The magnificent old city, which might have reached one million inhabitants at its zenith, was plundered and then razed to the ground in 1565 after a clash of cultures with the sultanates of the Deccan. It was among the first heritage sites in India to make it to the UNESCO list, and is arguably the most rewarding tourist destination in Karnataka. You need at the very least two full days to explore the richness of this site and to enjoy its pleasant rural surroundings.

The trip is usually feasible by night train from Bangalore (with berths, leaving late on Friday and coming back in the early hours of Monday); however, we have just checked that the regular tickets for this so-called 'Hampi express' have already sold out for the weekend within our program — the booking status has moved to a waitlist across the major AC seating tiers. An alternative is to book a tatkal ticket or make the same route by coach, which usually takes less time than the train, and can be booked at short notice. You would need to organize the trip by yourself, including (very basic) accommodation for one night in the area.

Mysore: downward dogs and glittering elephants

Mysore is a classic day-trip destination from Bangalore, the two cities being well connected by both expressway and a brisk rail line. As the global birthplace of Ashtanga Vinyasa (or simply "Mysore style") yoga, it sells itself as a wellness paradise. Enthusiasts at all levels can drop into various affordable shalas, be it for a single class or a weekend of zen.

For a complete change of vibe, explore Mysore Palace — a sprawling spectacle of Victorian scale and Indo-Saracenic grandeur, with a private wing still occupied by the Maharaja. Catch it at its glittering best on the Saturday night during its Sound and Light Show (19:00-20:00 for the English version). This time of the year, you will witness the buildup to the Dasara festival: the city's famous royal elephants are already in residence at the palace, and you can watch them in the mornings as they practice their heavy-lifting routines for the upcoming pageantry in October.

If you are undecided between this "Mysore pak" (a popular local sweet!) and our S^3 expedition, you could consider joining S^3 but leaving it at S^2, making your way to Mysore in the afternoon after visiting Srirangapatna, at relatively close distance.

Practicalities

- Venue for the lectures/talks: Ramanujan Lecture Hall
- Address: ICTS, Survey No. 151, Shivakote, Hesaraghatta Hobli, Bengaluru 560 089, India
- Email contacts:
  - ICTS Programs Office: `moduli@icts.res.in` (dedicated to our program)
  - ICTS Guest House: `guesthouse@icts.res.in` (a printer is available here)
- Phone contacts:
  - ICTS Reception: +91 80 4653 6000
  - ICTS Front Desk: +91 89 7006 0300 (also on WhatsApp; only 9:30 am to 5:30 pm)
  - ICTS Program Office: +91 80 4653 6052 (Dhananjayan CP)
  - ICTS Guest House Reception: +91 80 4653 6400 (available 24/7)
  - ICTS First-Aid Centre: +91 80 4653 6102
  - ICTS Security: +91 80 4653 6100 (emergency issues, bicycles)
- Program webpage: `https://www.icts.res.in/program/Mnpl2026`

- Shuttle service ICTS ↔ IISc: `https://www.icts.res.in/facilities/transport`
- Train travel: `https://www.ixigo.com/trains`

  Train tickets have various price categories (depending on the train and level of comfort, among other things). Popular routes often sell out; in this case, one can consider getting a waitlist ticket. Alternatively, one could get a *tatkal* ticket; this category of tickets only becomes available on the day before the journey after 10 am, and it incurs an extra fee.
- Swimming pool: it is free to use by ICTS guests. Please note that wearing a swimming cap is compulsory; you can buy one from the reception for ₹160.
- Cycling: you can borrow a bike for free from the security officer (phone contact above) at the main gate; a helmet and a lock will be provided.
- Laundry: washing machines, laundry soap and drying racks are available at the guest house.
- Money: there is an ATM at the ICTS campus, by the entrance to the Sports Centre.
- Coffee: pehaps the best option within the ICTS campus is the bar/cafeteria of the academic block, which has a functioning espresso machine (₹10 for a cup).
- On-site Wi-Fi access: SSID: `MNPL - 2026` Password: `Mn@25$me`
- Slack workspace: `https://monopolem.slack.com`