Recent advances in symplectic geometry

Tianyuan Mathematics Research Center

2026.05.24--2026.05.30, Kunming

Invited Speakers:

Christopher Brav (SIMIS)

Dylan Jesse Cant (UdeM)

Julian C Chaidez (USC)

Cheol Hyun Cho (SNU)

Huijun Fan (WHU)

Jungsoo Kang (SNU)

Yusuf Barış Kartal (NUS)

Otto Ferdinand Bernard van Koert (SNU)

Tatsuki Kuwagaki (Kyoto)

Lei Liu (SDU)

Siyang Liu (Uni Bonn)

Hiroshi Ohta (Nagoya)

Semon Rezchikov (IHES)

Yuhan Sun (ICL)

Guangbo Xu (Rutgers)

Jun Zhang (USTC)

Organizers:

Kenji Fukaya(THU), Honghao Gao (THU), Zhengyi Zhou (AMSS)

Conference Information

Since its rise in the 1980s, modern symplectic geometry has undergone long-term and rapid development. Beyond addressing its own fundamental problems and principles, symplectic geometry has both drawn from and influenced a wide range of related fields, such as dynamical systems, low-dimensional topology, geometric group theory, representation theory, and mathematical physics.

This workshop aims to bring together active researchers in symplectic geometry and related areas from around the world to discuss recent progress. The main topics include:

1. Foundations and structures of Floer-theoretic invariants in symplectic geometry, including higher algebraic structures, symplectic 2-categories, Floer homotopy theory, constructions and applications of integral Floer homology, and the construction and applications of high-dimensional Heegaard-Floer homology.

2. Classification and rigidity of Legendrian knots and Lagrangian fillings, including the structure and applications of Chekanov-Eliashberg algebras and relative rational symplectic field theory, as well as cluster structures on augmentation varieties and their applications.

3. Noncommutative geometry in symplectic geometry, i.e., the structures and geometry of Fukaya categories. This includes categorical dynamics, categorical braid groups, and their relationships with cluster algebras and transformation groups of symplectic manifolds.

4. Global geometry in symplectic geometry, such as the coarse geometry of symplectic or Hamiltonian groups, quantized rigidity of symplectic submanifolds, and C^0 symplectic rigidity. We will also focus on the tools used in these studies, including persistent module structures in Floer theory and the relationship and comparison between microlocal sheaf methods.

This workshop will promote communication and collaboration among symplectic geometers, help introduce new ideas, techniques, and problems, and provide fresh momentum for the development of the field.

Organizers

Kenji Fukaya (Tsinghua University)
Honghao Gao (Tsinghua University)
Zhengyi Zhou (Academy of Mathematics and Systems Science, Chinese Academy of Sciences)

Conference Schedule

May 24, 2026 (Sunday)

	Arrival and Registration

May 25, 2026 (Monday)

07:30–09:30	**Breakfast**	
	Chair: Honghao Gao	
09:30–10:30	**Jungsoo Kang** *Seoul National University*	Floer homology for Legendrian lifts in prequantization manifolds.
	Coffee Break	
	Chair: Honghao Gao	
11:00–12:00	**Tatsuki Kuwagaki** *Kyoto University*	Fukaya-Sheaf comparison over the Novikov ring.
12:00–14:30	**Lunch**	
	Chair: Bohan Fang	
14:30–15:30	**Jun Zhang** *University of Science and Technology of China*	Rabinowitz Floer cohomology with support.
	Coffee Break	
	Chair: Bohan Fang	
16:00–17:00	**Dylan Jesse Cant** *Université de Montréal*	Mod 2 Equivariant Quantum Cohomology For Lagrangians.
17:30–19:00	**Dinner**	

May 26, 2026 (Tuesday)

07:30–09:30	**Breakfast**	
	Chair: Kaoru Ono	
09:30–10:30	**Cheol Hyun Cho** *Seoul National University*	Geometric models of simple Lie algebras via singularity theory.
	Coffee Break	

	Chair: Kaoru Ono	
11:00–12:00	**Christopher Brav** *Shanghai Institute for Mathematics and Interdisciplinary Sciences*	Noncommutative geometry at infinity.
12:00–14:30	**Lunch**	
	Chair: Kenji Fukaya	
14:30–15:30	**Hiroshi Ohta** *Nagoya University*	Stokes curves, adiabatic limit and Lagrangian Floer theory .
	Coffee Break	
	Chair: Kenji Fukaya	
16:00–17:00	**Yusuf Barış Kartal** *National University of Singapore*	Generalized cohomology and symplectic cohomology
17:30–19:00	**Dinner**	

May 27, 2026 (Wednesday)

07:30–09:30	**Breakfast**	
	Chair: Weiwei Wu	
09:30–10:30	**Otto Ferdinand Bernard van Koert** *Seoul National University*	On generalizations of the Poincare-Birkhoff fixed point theorem.
	Coffee Break	
	Chair: Weiwei Wu	
11:00–12:00	**Lei Liu** *Shandong University*	Finite energy foliations and global dynamics in the restricted three-body problem.
12:00–14:30	**Lunch**	
	Sightseeing	
17:30–19:00	**Dinner**	

May 28, 2026 (Thursday)

07:30–09:30	**Breakfast**	
	Chair: Zhengyi Zhou	
09:30–10:30	**Huijun Fan** *Wuhan University*	Landau-Ginzburg model, tt^* geometry and integrable system.

	Coffee Break	
	Chair: Zhengyi Zhou	
11:00–12:00	**Siyang Liu** *University of Bonn*	A Symplectic and Categorical Analogue of the Invariant Cycle Theorem.
12:00–14:30	**Lunch**	
	Chair: Yu Pan	
14:30–15:30	**Semon Rezchikov** *IHES*	TBA
	Coffee Break	
	Chair: Yu Pan	
16:00–17:00	**Julian C Chaidez** *University of Southern California*	Convex hypersurfaces and robust heterodimensional dynamics.
17:30–19:00	**Dinner**	

May 29, 2026 (Friday)

	Chair: River Chiang	
09:30–10:30	**Guangbo Xu** *Rutgers University*	Reduced Gromov-Witten invariants without ghost bubble censorship.
	Coffee Break	
	Chair: River Chiang	
11:00–12:00	**Yuhan Sun** *Imperial College London*	Symplectic cohomology of sublevel sets.

May 30, 2026 (Saturday)

	Departure

Title and Abstract

May25, 2026 (Monday)

Floer homology for Legendrian lifts in prequantization manifolds

Jungsoo Kang

Seoul National University

Monotone Lagrangian submanifolds in an integral symplectic manifold admit Legendrian lifts to prequantization bundles. When the minimal Maslov number of a Lagrangian submanifold is greater than 2, its Legendrian lift is equipped with a well-defined Rabinowitz Floer homology. We establish an isomorphism between the quantum homology of a Lagrangian in the base and the Rabinowitz Floer homology of its Legendrian lift. We then discuss several applications of this correspondence. This is a joint work with Hanwool Bae and Sungho Kim.

Fukaya-Sheaf comparison over the Novikov ring

Tatsuki Kuwagaki

Kyoto University

Partially wrapped Fukaya categories of exact Lagrangians in Weinstein manifolds are known to be equivalent to categories of (micro)sheaves, following the work of Nadler–Zaslow and Ganatra–Pardon–Shende. In this talk, I will present a stronger form of this comparison, relating the Fukaya category over the Novikov ring to Tamarkin-type categories. This framework captures not only exact but also non-exact Lagrangians, as well as quantitative symplectic geometry. If time permits, I will also discuss an application to homological mirror symmetry over the Novikov ring. This talk is based on various joint works with Adrian Petr, Vivek Shende, and Bingyu Zhang.

Rabinowitz Floer cohomology with support

Jun Zhang

University of Science and Technology of China

In this paper, we investigate Rabinowitz Floer cohomology with support (RFH with support) on a closed symplectic manifold. This construction closely follows symplectic cohomology with support (also known as relative symplectic cohomology). Our approach imitates RFH in the classical domain setting via the mapping cone method. Additionally, we provide various computational results and symplectic rigidity phenomena. Finally, we relate this to the language of barcodes and study the barcode entropy induced by this RFH with support.

Mod 2 Equivariant Quantum Cohomology For Lagrangians

Dylan Jesse Cant

Université de Montréal

I will present joint work with Julio Sampietro-Christ which studies the following question: Suppose a Lagrangian submanifold L is preserved under a symplectic involution A; is there a Hamiltonian isotopy commuting with A which displaces L? If the answer is "no" then we say L is equivariantly non-displaceable. We prove certain Lagrangians in Liouville manifolds are equivariantly non-displaceable by developing a "quantum model" (à la Biran-Cornea) of the equivariant Floer cohomology (à la Seidel-Smith) and relating this model to the Floer-Gysin sequence developed by Biran-Khanevsky.

May 26, 2026 (Tuesday)

Geometric models of simple Lie algebras via singularity theory

Cheol Hyun Cho

Seoul National University

It is well-known that ADE Dynkin diagrams classify both the simply-laced simple Lie algebras and simple singularities. We introduce a polygonal wheel in a plane for each case of ADE, called the Coxeter wheel. We show that equivalence classes of edges and spokes of a Coxeter wheel form a geometric root system isomorphic to the classical root system of the corresponding type. This wheel is in fact derived from the Milnor fiber of corresponding simple singularities of two variables, and the bilinear form on the geometric root system is the negative of its symmetrized Seifert form. Furthermore, we give a completely geometric definition of simple Lie algebras using arcs, Seifert form and variation operator of the singularity theory.

Noncommutative geometry at infinity

Christopher Brav

Shanghai Institute for Mathematics and Interdisciplinary Sciences

In topology, one studies the boundary at infinity of a nice topological space in terms of the limit of complements of compact subsets. In algebraic geometry, there are at least two different approaches to defining the boundary at infinity: via some form of rigid analytic geometry (for example, solid algebraic geometry of Clausen-Scholze), and another via noncommutative geometry of differential graded categories, due to Efimov. We give a unified construction of the boundary at infinity compatible with both the analytic and noncommutative points of view. We motivate our construction by focusing on an explicit example that can be viewed from both topological, symplectic, and algebraic points of view, namely that of local systems on the circle. This is joint work in progress with Yuan Gao and Yingdi Qin.

Stokes curves, adiabatic limit and Lagrangian Floer theory

Hiroshi Ohta

Nagoya University

The WKB analysis is asymptotic analysis for solutions of certain ODE on a Riemann surface with a parameter. The Stokes curves on the Riemann surface play an important role in the WKB analysis. In this talk, I will discuss some aspect of the Stokes curves from the point of view of Lagrangian Floer theory. This is based on joint work with Tatsuki Kuwagaki.

Generalized cohomology and symplectic cohomology

Yusuf Barış Kartal

National University of Singapore

Symplectic cohomology forgets some of the topological information: the homology of the manifold can be arbitrarily complicated while its symplectic cohomology is zero. It is known how to recover rational homology from symplectic cohomology if its natural filtration and circle equivariant structure are remembered. However, this construction still loses the torsion part of the homology. In this talk, we show how to recover further information about the underlying symplectic manifold, including the torsion part of its homology, complex K-theory, and Morava K-theory from enhanced versions of symplectic cohomology and the structures on it via a modified Tate construction. This is joint work with Laurent Cote.

May 27, 2026 (Wednesday)

On generalizations of the Poincare-Birkhoff fixed point theorem

Otto Ferdinand Bernard van Koert

Seoul National University

We review some generalizations of ”Poincare-Birkhoff fixed point theorems”, including joint work with Agustin Moreno. We discuss potential applications, including the three-body problem, as well as some drawbacks of the current methods by comparing with some classical results, such as the Birkhoff-Lewis fixed point theorem, and generalizations by Moser.

Finite energy foliations and global dynamics in the restricted three-body problem

Lei Liu

Shandong University

We establish a general criterion for the existence of finite energy foliations on contact three-

manifolds with boundary, imposing strong global constraints on the associated Reeb flows. Our main abstract result shows that a configuration of periodic orbits, consisting of hyperbolic boundary orbits of Conley-Zehnder index 2 and an interior orbit of index at least 3, gives rise to a finite energy foliation, provided that no additional contractible periodic orbit satisfies a specific rotation, linking, and action condition. This identifies the precise dynamical obstruction to the existence of such foliations. These foliations organize the flow in a regime where the dynamics is typically chaotic, and imply the existence of infinitely many periodic orbits and infinitely many homoclinic/heteroclinic orbits to the Lyapunov orbits.

We apply this result to the circular planar restricted three-body problem. For mass ratios sufficiently close to 1/2 and energies slightly above the first Lagrange value, the regularized energy surface $RP^3\#RP^3$ admits a finite energy foliation whose binding consists of the retrograde orbits around the primaries together with the Lyapunov orbit near the first Lagrange point. Moreover, the convexity of the critical energy surface provides a proof of Birkhoff's retrograde orbit conjecture for mass ratios sufficiently close to 1/2 and all energies below the first Lagrange value. This work is joined with Professor Pedro A. S. Salomao.

May 28, 2026 (Thursday)

Landau-Ginzburg model, tt^* geometry and integrable system

Huijun Fan

Wuhan University

Singularity theory studies the local behavior of a map near its critical locus and is the main topic of algebraic geometry since the middle of last century. It can be also considered as part of Landau-Ginzburg model arising from the study of mirror symmetry. In this talk, I will report the progress on how to quantize the LG models via the method of geometrical analysis.

A Symplectic and Categorical Analogue of the Invariant Cycle Theorem

Siyang Liu

University of Bonn

Invariant cycle theorem is an important result in Hodge theory, which states that for a given degeneration of projective algebraic varieties, rational homology cycles that are invariant under monodromy action will survive under degeneration. In this talk, I will present a symplectic analogue of this theorem, under the case when the degeneration is "atypical", where fibres are non-proper and no singularities appear, in terms of wrapped Fukaya categories and symplectic cohomologies. We will also present some of the applications of this result. This is a joint work in preparation with Sheel Ganatra, Wenyuan Li and Peng Zhou.

TBA

Semon Rezchikov

Institut des Hautes Études Scientifiques

TBA

Convex hypersurfaces and robust heterodimensional dynamics

Julian C Chaidez

University of Southern California

A closed oriented hypersurface in a contact manifold is called robustly non-convex if it cannot be approximated by convex hypersurfaces in the C^2-topology. In recent work, I constructed the first examples of such hypersurfaces in standard contact 2n+1-space using tools from partially hyperbolic dynamics and blenders.

In this talk, I will explain a proof that every closed oriented hypersurface in a contact manifold of dimension five and above is isotopic to a robustly non-convex hypersurface by an arbitrarily C^0-small isotopy. The proof uses a robust and local obstruction to convexity built using blenders, and reveals an intriguing connection between convexity and the well-known Palis Conjecture in dynamics.

May 29, 2026 (Friday)

Reduced Gromov-Witten invariants without ghost bubble censorship

Guangbo Xu

Rutgers University

Traditional approaches for reduced Gromov-Witten invariants (by Zinger in genus 1 and Ekholm-Shende for Calabi-Yau threefolds) rely crucially on refined Gromov compactness. I will explain why these invariants are indeed topological, in the sense that they come from a stratification on the moduli spaces of stable maps and a (normal) complex structure. This method can be applied to other situations such as splitting formula of Gromov-Witten invariants with respect to simple normal crossing degenerations.

Symplectic cohomology of sublevel sets

Yuhan Sun

Imperial College London

Given a smooth function on a closed symplectic manifold, we study the complexity of its sublevel sets, measured by symplectic cohomology. Applications include a construction of partial symplectic quasi-state and an estimate of asymptotic spectral invariants. If time permits, we also discuss the case of contact manifolds. Based on some recent reflections of an older work with Mak and Varolgunes.

List of Participants

Erkao Bao	University of Minnesota
Rabah Mohamad Bassam	Morningside Center of Mathematics, Chinese Academy of Sciences
Christopher Brav	Shanghai Institute for Mathematics and Interdisciplinary Sciences
Dylan Jesse Cant	Université de Montréal
Julian C Chaidez	University of Southern California
Jialiang Chen	Zhejiang University
River Chiang	National Cheng Kung University
Cheol Hyun Cho	Seoul National University
Lilte Du	Academy of Mathematics and Systems Science, Chinese Academy of Sciences
Huijun Fan	Wuhan University
Bohan Fang	Peking University
Qi Feng	University of Science and Technology of China
Kenji Fukaya	Tsinghua University
Honghao Gao	Tsinghua University
Yuan Gao	Nanjing University
Zhen Gao	Universität Augsburg
Wenmin Gong	Beijing Normal University
Kainan Guo	Academy of Mathematics and Systems Science, Chinese Academy of Sciences
Hao Jiao	Tsinghua University
Jungsoo Kang	Seoul National University
Yusuf Barış Kartal	National University of Singapore
Otto Ferdinand Bernard van Koert	Seoul National University
Tatsuki Kuwagaki	Kyoto University
Wenyuan Li	University of Southern California
Youlin Li	Shanghai Jiao Tong University
Siyang Liu	University of Bonn
Lei Liu	Shandong University
Han Lou	Peking University
Jie Min	Hetao Institute of Mathematics and Interdisciplinary Sciences
Hiroshi Ohta	Nagoya University
Kaoru Ono	Kyoto University
Yu Pan	Tianjin University
Yingdi Qin	Shanghai Institute for Mathematics and Interdisciplinary Sciences

Semon Rezchikov	Institut des Hautes Études Scientifiques
Shanon Rubin	Tsinghua University
Yuhan Sun	Imperial College London
Yuze Sun	Peking University
Xiudi Tang	Beijing Institute of Technology
Zhengfang Wang	Nanjing University
Weiwei Wu	Zhejiang University
Guangbo Xu	Rutgers University
Yicheng Yang	Tsinghua University
Tianyu Yuan	Eastern Institute of Technology
Jun Zhang	University of Science and Technology of China
Shuo Zhang	Academy of Mathematics and Systems Science, Chinese Academy of Sciences
Zhengyi Zhou	Academy of Mathematics and Systems Science, Chinese Academy of Sciences
Antong Zhu	University of Science and Technology of China

Practical Information

About the Center

The Tianyuan Mathematics Research Center (hereinafter referred to as "the Center") was established in July 2023. It is an international platform for research and exchange in mathematics and interdisciplinary sciences, jointly supported by programs of the Tianyuan Fund of the National Natural Science Foundation of China and the National Development and Reform Commission. The Center is affiliated with the Academy of Mathematics and Systems Science, Chinese Academy of Sciences.

Location

The Center is located in the Chai Shitan Reservoir area, Yiliang County, Kunming, Yunnan Province, within a National Class I Public Welfare Forest. It is surrounded by mountains on three sides and faces water on one side, offering a scenic environment and pleasant climate.

- Altitude: 1,700 meters
- Distance to Kunming Changshui International Airport: $\sim$90 km (about 1.5 hours by car)
- Distance to Stone Forest Scenic Area: 30 km
- Distance to Jiuxiang Scenic Area: 20 km

Campus Overview

- Total land area: $\sim$27,000 m^2
- Green area: $\sim$19,000 m^2
- Total building area: $\sim$6,000 m^2

The Center consists of three main two-story buildings:

- Research Building
- Experts' Residence Building
- Logistics and Support Building

Accommodation (Experts' Residence Building)

The residence building includes 56 rooms:

- 44 single rooms (1.5 m bed)
- 11 standard twin rooms (1.2 m beds)
- 1 accessible single room (1.2 m bed)

All rooms are equipped with private bathrooms and showers.

Facilities include:

- 4 staircases and 2 elevators
- Meditation pavilion in the inner courtyard
- Public restrooms, linen room, and laundry room
- Self-service coffee machine (2nd floor lounge area)
- Self-service laundry room with washer-dryer (2nd floor, southwest corner)

Research Facilities (Research Building)

- Large lecture hall (capacity: 100), equipped with HD LED screen and sliding blackboards
- 1 medium-sized conference room (80 m^2, HD LED screen)
- 4 small meeting rooms (35 m^2, HD short-throw projector and blackboards)
- 21 seminar/work rooms (20 m^2 each)
- 1 library reading room
- 1 café

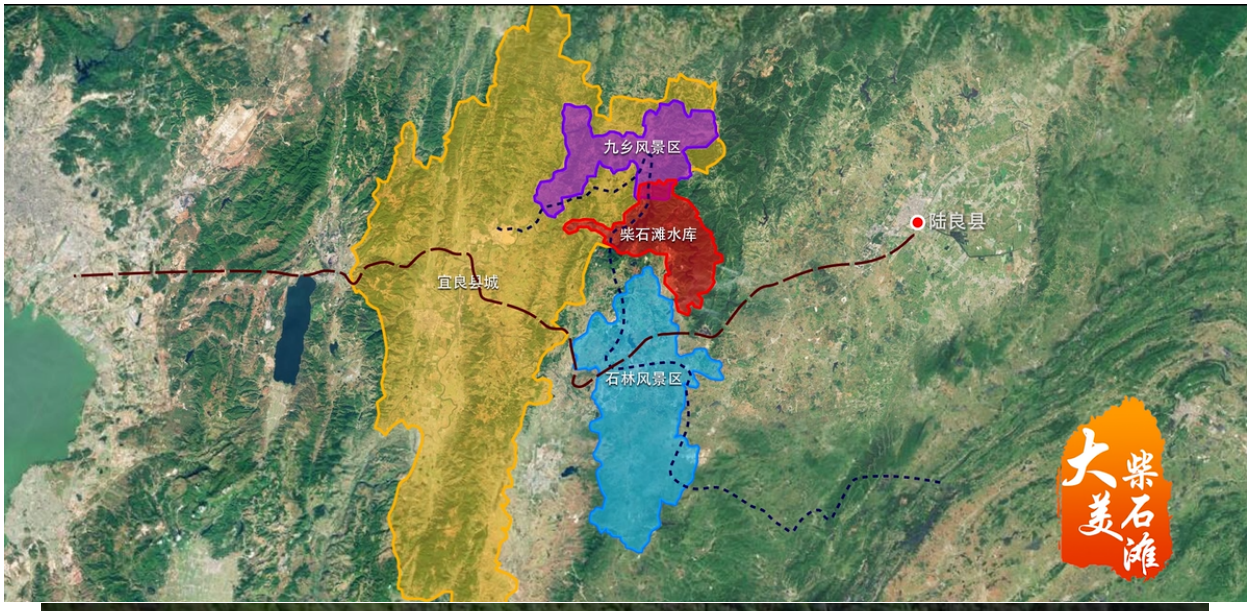
Dining and Services (Logistics and Support Building)

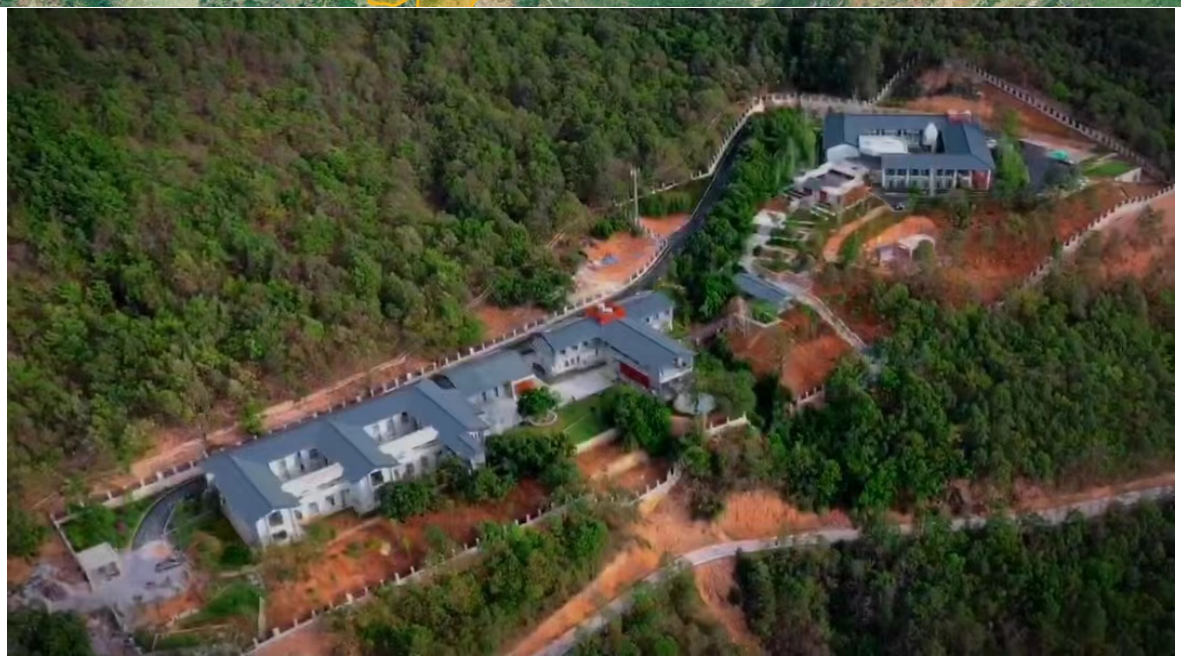
- Activity room / staff fitness room ("Staff Home"), $\sim$50 m^2
- 7 staff dormitory rooms ($\sim$20 m^2 each)
- Dining hall ($\sim$200 m^2), accommodating up to 60 people simultaneously

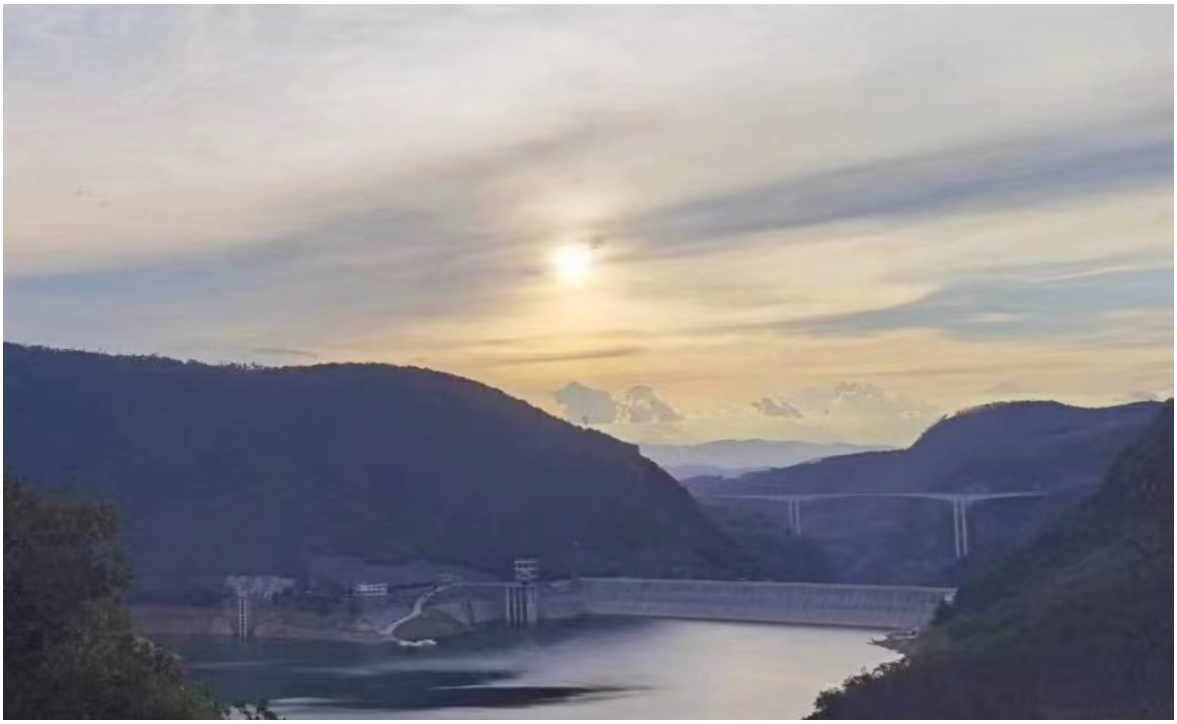
Safety and Infrastructure

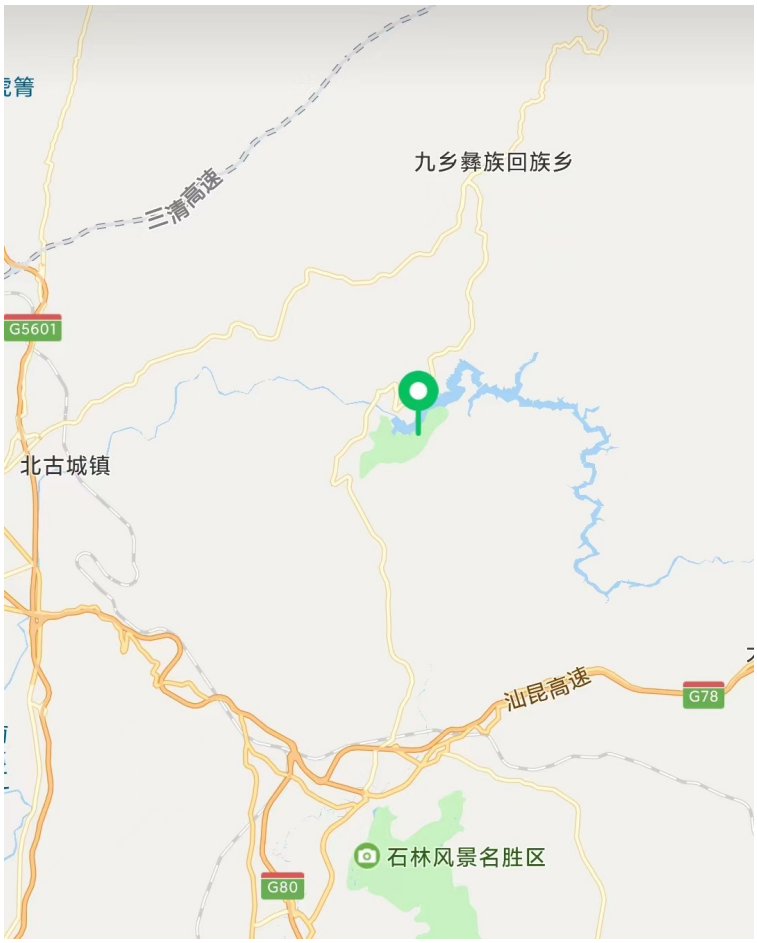
The Center is enclosed by perimeter walls and equipped with:

- Guard room
- Fire water tank and pump room
- Reclaimed water treatment station
- Security monitoring system





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三清高速
G5601
北古城镇
汕昆高速
G78
石林风景名胜区
G80


寻甸回族
彝族自治县
G56
曲靖市
马龙区
嵩明县
盘龙区
G5601
五华区
陆良县
官渡区
宜良县
昆明市
石林彝族自治县
G8511
晋宁区
澄江市
G80
泸西县
弥勒市
玉溪市
江川区