IBS Key Strategic Research Areas

Category			Research Areas
Mathematics/ Computer science (5)			■ Geometry and algebraic/topological structure of manifolds
			■ Arithmetic and algebraic structure
			■ Nonlinear Analysis
			■ Scientific computing
			◦ Discrete Structures and Combinatorial Complexity
			◦ Stochastic modelling and probability
			◦ Computational and mathematical biology
			■ ◦ Mathematical and statistical data sciences
			◦ Mathematical foundation for quantum and cyber security
			◦ Mathematical machine learning
Physics (13)	Theoretical physics		■ Theoretical fundamental physics
			■ Condensed-matter and complex systems theory
	Condensed matter physics	Quantum materials	■ Low dimensional quantum materials
			■ New quantum matter for quantum science
			■ 2D Quantum Heterostructures
		Extreme state materials	■ Condensed matter at extreme conditions
	Quantum information science		■ Qunatum nanoscience
			■ Ultracold atomic and molecular physics
	Nuclear physics		■ Low-energy nuclear physics
			■ Nuclear matter physics with rare isotopes
	Particle physics		■ Experimental physics beyond standard model
			■ Next generation experimental particle physics
	High energy density physics		■ Exploration and control of relativistic laser-matter interactions
Earth Science (4)	Climate change and climate physics		■ Climate physics
			■ AI-climate science
			■ Ocean carbon cycle
	Atmospheric and planetary science		■ Planetary science

Category		Research Areas
Chemistry (11)	Chemical physics	■ Molecular dynamics of complex system
		■ Frontiers in Reaction dynamics
		■ Experimental and theoretical quantum dynamics
	Chemical reactivity & synthesis	■ Catalytic hydrocarbon functionalization
		■ Next-generation synthesis of new functional molecules
	Chemistry for life science	■ Chemical biology
		■ Molecular neuroscience
	Chemistry for noble functional materials	■ Fundamentals & applications of nanoparticles
		■ Carbon and related materials
		■ Chemical assembly of functional matter
	Chemistry for sustainability	■ Chemistry for sustainability
Life Science (16)	Brain science	■ Cognition and memory
		■ Synaptic brain dysfunctions
		■ Brain-inspired artificial intelligence
	Life code	■ RNA biology
		■ Genomic integrity
		■ Gene editing and its application
		■ Molecular synthetic biology
		■ Complex biology
	Development/ Growth/Aging	■ Vascular genesis, differentiation, heterogeneity and regeneration
		■ Developmental biology
		■ Aging biology
		■ Neuroimmunology
		■ Phyto-environmental biology
	Infectious diseases	■ Virology
		■ Immunology
		■ Virome and applied platform research
Interdisciplinary (8)		■ Algorithmic and robotized synthesis
		■ Nano-bio interface science
		■ Integrative brain imaging research
		■ Structural biology science
		■ Ultralow energy neuromorphic system
		■ Single-cell level integrated analysis
		■ Artificial photosynthesis
		■ AI-based protein design

※ ▭ : Research areas of current/previous Centers, ▭ : Key strategic research areas