Titles and Abstracts

1. Junpeng Cao, Institute of Physics, Chinese Academy of Sciences, China
   Title: Entanglement-assisted local convertibility in quantum critical systems
   Abstract: In this talk, I will introduce the conversions between the ground states in quantum critical systems via entanglement-assisted local operations and classical communications (ELOCC). We propose an alternative method to reveal the different convertibility by local operations when a quantum phase transition occurs. We have studied the ground-state local convertibility in the one-dimensional transverse field Ising model, XY model and XXZ model. It is found that the ELOCC convertibility suddenly changes at the phase transition points. In the transverse field Ising model the ELOCC convertibility between the first-excited state and the ground state are also distinct for different phases. The relation between the order of quantum phase transitions and the local convertibility is discussed.

2. Kai Chen, University of Science and Technology of China
   Title: Certifying Non-locality via Uncertainty Relations
   Abstract: Uncertainty principle lies at the heart of quantum mechanics, which places strict constraints on outcomes of measurements on quantum systems. Non-locality is exhibited when measurements results of spacially separated quantum system can not be explained by kinds of local causal theories. The relationship between uncertainty relations and non-locality, thus, allow to shed new lights on formulation of quantum mechanics. As a novel application, the relationship can help to certify non-locality, which is an essential source in quantum cryptography. Particularly, as a subtle form of non-locality, Einstein-Podolsky-Rosen (EPR) steering holds the potential for shared entanglement verification, even if the one-sided measurement device is untrusted. We will show how local uncertainty relations is related to such kinds of non-locality, and provide a EPR steering criterion based on uncertainty relations. The criterion is experimentally friendly, in the sense that it is easy to be generalized to arbitrary high dimensional states and any size of measurement settings. Furthermore, we show that the realignment method, which is an extremely useful tool of entanglement verification, also works directly for EPR steering detection.
   In collaboration with Yi-Zheng Zhen, Yu-Lin Zheng, Wen-Fei Cao, Li Li, Zeng-Bing Chen, Nai-Le Liu.
   1 National Laboratory for Physical Sciences at Microscale and Department of Modern Physics University of Science and Technology of China, Hefei, 230026, P.R. China and 2 CAS Center for Excellence and Synergetic Innovation Center in Quantum Information and Quantum Physics, University of Science and Technology of China, Hefei, Anhui 230026, China

3. Goswami Debashish, Indian Statistical Institute, India
   Title: Quantum Symmetry of Classical Spaces

Abstract: We discuss whether one can have a genuine quantum group symmetry of a purely classical system. To put mathematically, we choose the C* algebraic framework and ask the following question: Can a genuine compact quantum group (in the sense of Woronowicz) have a faithful co-action on the C* algebra of continuous functions on a compact hausdorff space? It is easy to get an affirmative answer when the space is disconnected with at least four components, but even for a connected space, the answer remains positive. The situation changes if we ask a similar question for C^infty(M) for a compact connected smooth manifold and demand the co-action to be smooth in a natural sense. It is a conjecture that there is no genuine quantum symmetry in this case and I, along with my student S. Joardar proved this for certain important cases which we'll briefly discuss. The general case is still open. If time permits, I can also touch a purel;y algebraic approach to a similar problem and results obtained by Pavel Etingof and Chelsea Walton.

4. Jiangfeng Du, University of Science and Technology of China
   Title: Quantum Computation based on Spins in Solid State Systems
   Abstract: In the past decade, there has been tremendous progress in the development of the quantum computation, especially in solid-state quantum computing. The quantum information storage, the precise manipulation of quantum bits, the transmission of quantum information and quantum bit high efficiency measurement have been a great development. For example, in quantum dots, nuclear magnetic resonance, electron paramagnetic resonance, superconductivity qubits and so on. But most of the systems are still distance from practical quantum computation tasks. Thus it is necessary to research different quantum systems and combine them together to seek a possible way for scalable quantum computation proposal. Spin plays an important role among lots of proposals and is one of the best way for practical quantum computation.
   Herein, we mainly focus on the basic theory and experiment fields of quantum computations which base on spins in solid-state system. We concern on several respects such as decoherence regime, dynamical decoupling methods for suppressing the noise induced by the environment, the initialization of the quantum spin states, high fidelity quantum operations and readout, the entanglement of multiqubits and seek possible methods for scalable quantum computation.

5. Shaoming Fei, Capital Normal University, China
   Title: Non-locality, Quantum Correlations and Uncertainty Relations
   Abstract: We study the characterization of quantum uncertainty principle, quantum non-locality, quantum correlations in multipartite quantum systems and the relations among them. In particular, state-dependent or state-independent multi-observable uncertainty relations in terms of sum and product form of variance or deviation, probability distribution, error and disturbance, with or without quantum memories, as well as Bell inequalities.

6. Yu Guo, Shanxi Datong University, China
   Title: Non-commutativity measure of quantum discord
   Abstract: Quantum discord is a manifestation of quantum correlations due to non-commutativity rather than due to entanglement. Two measures of quantum discord by the amount of non-commutativity are proposed via the trace norm and the Hilbert-Schmidt norm respectively. These measures can be calculated easily for any state with arbitrary dimension. It is shown by several examples that these measures can reflect the amount of the original quantum discord.

7. Ting Gao, Hebei Normal University, China
   Title: Separability criteria via sets of mutually unbiased measurements
   Abstract: Mutually unbiased measurements (MUMs) are generalized from the concept of mutually unbiased bases (MUBs) and include the complete set of MUBs as a special case, but they are superior to MUBs as they do not need to be rank one projectors. We investigate entanglement detection using sets of MUMs and derive separability criteria for multipartite qudit systems, arbitrary high-dimensional bipartite systems of a d_1-dimensional subsystem and a d_2-dimensional subsystem, and multipartite systems of multi-level subsystems. These criteria are of the advantages of more effective and wider application range than previous criteria. They provide experimental implementation in detecting entanglement of unknown quantum states.

8. Feng Han, Tsinghua University, China
   Title: Tsinghua University i-Center Mentor
   Abstract: Quantum, AI and BlockChain
   My major research is on the BlochChain's AI. I found Maxwell's Demon must be based on the Quantum uncertainty and it's AI can explain how the Bitcoin's BlockChain can have the Intelligence.

9. Bobo Hua, Fudan University, China
   Title: Local Hidden Variable Models for Werner States
   Abstract: A quantum state is said to admit a local hidden variable (LHV) model if all the measurement outcomes can be modeled as a classical random distribution over a probability space. The state is called local if it admits an LHV model. In the literature, it is of interest when a two-qubit Werner state with a parameter is local. In this talk, we report a bound of the parameter for the non-locality of Werner states.

10. Zhengfeng Ji, University of Technology, Sydney, Australia
    Title: Sample-complexity of quantum state tomography
    Abstract: The sample-complexity problem of tomography asks how many copies of an unknown mixed quantum state are necessary and sufficient to determine the state. Previously, it was known that estimating states to error ϵ in trace distance

requires $O(dr^2/\epsilon^2)$ copies for a d-dimensional density matrix of rank r. In this talk, we present a measurement scheme (*POVM*) that requires O(dr/δ)ln(d/δ) copies of ρ to error δ in infidelity, and a matching lower bound up to logarithmic factors. This also implies that O ((dr/ϵ^2)ln(d/ϵ)) copies suffice to achieve error ϵ in trace distance.

11. Naihuan Jing, North Carolina State University, USA
    Title: Quantum discords of general X-states
    Abstract: We report our recent solution of the quantum discord of the general X-state. Exact solutions of the quantum discord are obtained for several nontrivial regions of the five parametric space for the quantum state. Exceptional solutions are determined via an iterative algorithm, and some of those examples are first solved analytically.
    We also discuss its generalization to the super case.

12. Ming Li, China University of Petroleum, Qingdao
    Title: The local filtering operations and quantum non-locality
    Abstract: In this talk, I will give a introduction about the local filtering operations and non-locality. I will review a series of Bell inequalities for both biand multi-partite quantum systems. The maximal violations of someof these Bell inequalities over all quantum systems are introduced. The behavior of the maximal violation under the local filtering operations is investigated. (Joint work with Prof. Shao-Ming Fei, Prof. Xianqing Li-Jost, and Prof. Chang-Pu Sun.)

13. Siyuan Liu, Northwest University, China
    Title: Quantum phase transition and local convertibility in XY model
    Abstract: We study the quantum phase transition in XY model by considering the behavior of global quantum correlations and ground-state local convertibility. We find that the two kinds of phase transitions in the studied model can be characterized by the features of global quantum discord (GQD) and the corresponding quantum correlations. On the other hand, the local operations and classical communications (LOCC) convertibility is examined by the majorization relations and the entanglement-assisted local operations and classical communications (ELOCC) via R´enyi entropy interception. In the phase diagram of XY model, LOCC convertibility and ELOCC convertibility of ground-states are presented and compared. It is shown that different phases in the phase diagram of XY model can have different LOCC or ELOCC convertibility, which can be used to detect the quantum phase transition. This study will enlighten extensive studies of quantum phase transitions from the perspective of global quantum correlations and local convertibility, e.g., finite-temperature phase transitions and other quantum many-body models.

14. Guilu Long, Tsinghua University, China

    Title: Quantum Secure Direct Communication in a noisy environment: Theory and Experiment

    Abstract: Quantum communication holds promise for absolutely security in secret message transmission. Quantum secure direct communication (QSDC) is one of three major branches of quantum cryptography in which secret messages are sent directly over a quantum channel with security{1,2}. QSDC offers higher security and instantaneousness in communication, and is a great improvement to the classical communication mode{3}. It is also a powerful basic quantum communication primitive for constructing other quantum communication tasks such as quantum bidding, quantum signature and quantum dialogue and so on. Since the first QSDC protocol{1} proposed in 2000, it has become one of the extensive research focuses. In this talk, the basic ideas of QSDC will be reviewed, and major QSDC protocols will be described, such as the efficient-QSDC protocol{1}, the two-step QSDC protocol, the one-time-pad QSDC protocol, the high-dimensional QSDC protocol and so on. Experimental progress is also developing steadily, and will also be reviewed. In particular, the quantum one-time-pad QSDC protocol has recently been successfully demonstrated experimentally{4}, in which the block-data transmission technique, which is crucial to QSDC, has been demonstrated explicitly for the first time.

    {1} G L Long and X S Liu, “Theoretically efficient high-capacity quantum-key-distribution scheme”, Phys. Rev. A 65 , 032302 (2002)

    {2} Hao Yin et al, Principles and Technologies of Quantum Secure Communications, Electronic Industry Press, 2013.

    {3} Zhu Z C, Hu A Q, Fu A M. Cryptanalysis and improvement of the controlled quantum secure direct communication by using four particle cluster states. International Journal of Theoretical Physics, 2014, 53(5): 1495-1501.

    {4} Jian-Yong Hu et al, Experimental quantum secure direct communication with single photons. arXiv preprint arXiv:1503.00451, 2015.

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15. Shunlong Luo, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, P. R. China

    Title: Information extraction from spins

    Abstract: We consider extracting information from one spin, as well as from two par-allel or antiparallel spins, from the viewpoint of parameter estimation. By comparing two fundamental figures of merit based on fidelity and quantum Fisher information for assessing information quality, we demonstrate that these criteria yield different strategies for optimally extracting spin information. A surprising observation is that while for a single spin as well as for parallel spins, quantum Fisher information cannot be fully extracted by any uniform measurement, this is not the case for antiparallel spins. A simple uniform measurement fully extracting

quantum Fisher information in antiparallel spins is identified. This reveals a significant feature of antiparallel spins from the perspective of Fisher information, and provides an alternative illustration of the idea that antiparallel spins carry more information than parallel spins.

16. Xiongfeng Ma, Tsinghua University, China
    Title: Semi self-testing quantum random number generation
    Abstract: Random numbers play an indispensable role in modern society in various arenas of finance, cryptography, and computation. However, the source of randomness in such numbers is typically a problem in a physical random number generator; the "random" seeds are not truly random and can accordingly limit cryptographic security. In this talk, we shall investigate two practical semi self-testing quantum random number generation schemes: source-independent and measurement-device-independent. Both of them are loss-tolerant and practical for current technologies.
    Moreover, we investigate the randomness generation rate for different parameters in the source-independent case such as the efficiency of the detector. It is important to note that while we allow our laser source to emit multiple photons, this situation may in some cases increase the error associated with our random numbers. [Phys. Rev. X 6, 011020 (2016)]
    Simulations show that the measurement-device-independent protocol can be implemented efficiently with a practical coherent state laser and other standard optical components. The security analysis of the scheme consists mainly of two parts: measurement tomography and randomness quantification, where several new techniques are developed to characterize the randomness associated with a positive-operator valued measure. [New J. Phys. 17, 125011 (2015)]

17. Zhihao Ma, Shanghai Jiaotong University, China
    Title: Conservation law for Uncertainty relations and quantum correlations
    Abstract: Uncertainty principle, a fundamental principle in quantum physics, has been studied intensively via various uncertainty inequalities. Here we derive an uncertainty equality in terms of linear entropy, and show that the sum of uncertainty in complementary local bases is equal to a fixed quantity. We also introduce a measure of correlation in a bipartite state, and show that the sum of correlations revealed in a full set of complementary bases is equal to the total correlation in the bipartite state. The surprising simple equality relations we obtain imply that the study on uncertainty principle and correlations can rely on the use of linear entropy, a simple quantity that is very convenient for calculation.

18. Florian Mintert, Imperial College London, United Kingdom
    Title: Complete positivity of non-Markovian quantum dynamics
    Abstract: We derive a purely algebraic framework for the identification of hierarchy equations of motion that induce completely positive dynamics and demonstrate the applicability of our approach with several examples. We find

bounds on the violation of complete positivity for microscopically derived hierarchy equations of motion and construct well-behaved phenomenological models with strongly non-Markovian revivals of quantum coherence.

19. Choo Hiap Oh, National University of Singapore & Sixia Yu, Hefei National Laboratory for Physical Sciences at Microscale & University of Science and Technology of China
    Title: Nonlocal bound entangled states
    Abstract: Bound entanglement, being entangled yet not distillable, is essential to our understanding of the relation between nonlocality and entanglement besides its applications in certain quantum information tasks. Recently, bound entangled states that violate a Bell inequality have been constructed for a two-qutrit system, disproving a conjecture by Peres that bound entanglement is local. In this talk, such kind of nonlocal bound entangled states for all finite dimensions larger than two will be presented, making possible their experimental demonstrations on most general systems.

20. Josh Izaac, University of Western Australia
    Title: Quantum centrality testing on directed graphs via pseudo-Hermitian quantum walks
    Abstract: Various quantum-walk based algorithms have been proposed to analyse and rank the centrality of graph vertices. However, issues arise when working with directed graphs – the resulting non-Hermitian Hamiltonian leads to non-unitary dynamics, and the quantum walker is no longer conserved. Several modifications have been proposed to deal with the resulting non-unitary behaviour, namely unitary dilation, Szegedy quantum walks, and open-quantum walks with deco-herence. Unfortunately, these proposed algorithms have numerous setbacks in the case of unitary dilation and Szegedy walks, significantly increased states-paces must be used to ensure unitary behaviour (resulting in increased computational cost), whereas the open-quantum system must introduce classical behavior, affecting potential quantum speedup.
    One such solution to this problem may lie in the field of PT (parity-time) symmetry or pseudo-Hermiticity – a field arising from the observation that non-Hermitian Hamiltonians that exhibit PT-symmetry have been found to possess real eigenvalue spectra. Surprisingly, such examples have arisen in physically observed systems such as nuclear physics, quantum field theory, condensed matter, and optics.
    In this presentation, we discuss a quantum algorithm for centrality testing on directed graphs using pseudo-Hermitian quantum walks, allowing probability conserving non-unitary evolution. Furthermore, we compare this to the classical PageRank algorithm, and highlight a case where the pseudo-Hermitian quantum walk better characterizes the system. Further applications of this framework may include modeling biochemical quantum systems with direction, such as protein folding or electron transport.

Finally, if time permits, I will also discuss a single-particle graph mapping for a continuous-time quantum walk of multiple fermions and bosons.

21. Xinhua Peng, University of Science and Technology of China
    Title: Controlling spin systems in complex, correlated environment: reachable sets, polarization enhancement, quantum state engineering and spin-lattice relaxation time measurement
    Abstract: Precisely characterizing and controlling realistic open quantum systems is one of the most exciting frontiers in quantum sciences and technologies. Here, we present methods of approximately computing reachable sets for coherently controlled dissipative systems, which is very useful for assessing control performances. Using the theoretical results, we implement some tasks of quantum control in open systems: increasing polarization and preparing pseudo-pure states. Moreover, by manipulating the cross relaxation effect, one can also measure accurately spin-lattice relaxation time measurement for dilute spins in solid-State NMR. Our work shows interesting and promising applications of environment-assisted quantum dynamics.

22. Jens Siewert, University of the Basque Country UPV/EHU, E-48080 Bilbao, Spain & Basque Foundation for Science, E-48011 Bilbao, Spain
    Title: Monogamy equalities for N-qubit entanglement
    Abstract: A striking result from nonrelativistic quantum mechanics is the monogamy of entanglement, which states that different types of entanglement in a state cannot be freely shared among the parties. While there had been the exact quantitative relation for three qubits and also several inequalities describing monogamy properties it was not clear to what extent exact monogamy relations were a general feature of quantum mechanics. We have proven that in all many-qubit systems there exist strict monogamy laws (that is, equalities) for quantum correlations. They can be derived by exploiting the curious relation between the nonrelativistic quantum mechanics of qubits and Minkowski space.

23. Yuanhong Tao, Yanbian University, China
    Title: Construction of Maximally Entangled Bases and Their Mutual Unbiased Property in $C^d \otimes C^d$
    Abstract: Mutually unbaised bases is an important tool in many quantum information processing. The maximal number of mutually unbaised bases for given space C^d has always been a hot issue. It has been shown that the maximum number N(d) of MUBs in C d is no more than $d + 1$ and $N(d) = d + 1$ if d is a prime power. Whereas d is a composite number, $N(d)$ is still unknown. So there are many attempts on different constructions of mutually unbiased bases.
    In this note, we focus on the construction of mutually unbiased maximally entangled bases. We first establish one systematic way of constructing maximally entangled bases in bipartite system $C^d \otimes C^{kd}$ ($k \in Z^+$), then discuss mutually unbiased maximally entangled bases in $C^d \otimes C^{kd}$, and presented 5 mutually

unbiased maximally entangled bases in $C^2 \otimes C^4$ and 3 mutually unbiased maximally entangled bases in $C^2 \otimes C^6$.

To construct maximally entangled bases in arbitrary bipartite systems $C^d \otimes C^d$, we then construct another type of maximally entangled basis in bipartite systems $C^d \otimes C^{kd}$ ($k \in Z^+$), and generalize such maximally entangled basis in arbitrary bipartite systems $C^d \otimes C^{d0}$. We also study the mutual unbiased property of the two types of maximally entangled bases in bipartite systems $C^d \otimes C^{kd}$. In particular, explicit examples in $C^2 \otimes C^4$, $C^2 \otimes C^8$ and $C^3 \otimes C^3$ are presented.

24. Dianmin Tong, Shandong University, China

Title: Existence of Measure-Independent Freezing of Quantum Coherence

Abstract: Quantum coherence is a useful physical resource in quantum information processing. A challenge in exploiting the resource is to protect coherence from decoherence caused by noise. Now, after having been equipped with the knowledge of coherence measures [1], it becomes possible to analyze under which dynamical conditions the coherence of an open system is frozen (i.e. unaffected) in a noisy channel. Studies on this problem have been started in Ref. [2] where the authors found that a family of coherence measures (i.e. the coherence measures based on bona fide distances) are frozen for some initial states in the local identical bit flip channels. This finding illustrates that there exist such quantum states of which some coherence measures remain constant in certain noisy channels, and hence the ability of such states to perform quantum information processing tasks is not weakened by the noise if the ability exploited in the task is based on these frozen coherence measures. However, although a noisy channel may not weaken some abilities of a state in quantum information processing if these abilities are based on the frozen coherence measures, it can still weaken the other abilities that are based on unfrozen coherence measures. Only the states with measure-independent freezing of coherence (i.e. all coherence measures being frozen) can keep all the abilities of coherence resource totally unaffected.

In this talk, we report our recent research results on the above issue. We find that all measures of coherence are frozen for an initial state in a strictly incoherent channel if and only if the relative entropy of coherence is frozen for the state. Our finding reveals the existence of measure-independent freezing of coherence, and provides an entropy-based dynamical condition in which the coherence of an open quantum system is totally unaffected by noise [3].

[1]T. Baumgratz, M. Cramer, and M. B. Plenio, Phys. Rev. Lett. 113, 140401 (2014).

[2]T. R. Bromley, M. Cianciaruso, and G. Adesso, Phys. Rev. Lett. 114, 210401 (2015).

[3] Xiao-Dong Yu, Da-Jian Zhang, C. L. Liu, and D. M. Tong, arXiv:1603.01124

[quant-ph].

25. Jingbo Wang, University of West Australia, Australia
    Title: Quantum walk on graphs, unitary and non-unitary operations, quantum circuit complexity
    Abstract: Quantum walk represents a generalised version of the well-known classical random walk. Regardless of their apparent connection, the dynamics of a quantum walk is often non-intuitive and far deviates from its classical counterpart. A multi-particle quantum walk presents an even richer dynamical system due to intrinsic quantum correlation and interaction. Current research is suggesting potential applications across a wide range of fields in science and engineering. In this talk, I will first give a brief introduction to quantum walks on graphs and digraphs, and then discuss efficient quantum circuit implementation of the corresponding unitary and non-unitary operations.

26. Yupeng Wang, Institute of Physics, Chinese Academy of Sciences
    Title: Off-diagonal Bethe Ansatz and Its applications
    Abstract: In recent years, important applications of quantum integrable models in quantum information have been reached. In this talk, I review the newly developed off-diagonal Bethe Ansatz, an analytic theory for approaching exact solutions of generic quantum integrable models either with or without $U(1)$-symmetry. These solutions are quite useful in a variety of fields among which also includes quantum information.

27. Zhaoqi Wu, Nanchang University, China
    Title: Information transfer in generalized probabilistic theories
    Abstract: During the past few years, studies on quantum information and quantum computation theory poses an urgent request for a thorough understanding of the foundations of quantum mechanics and how to draw the line between classical and quantum. Generalized probabilistic theories is a framework which goes beyond either classical or quantum theory. In this talk, we will briefly introduce the framework of generalized probabilistic theories (GPT), and show our recent work on information transfer problems under different hypotheses in GPT framework.

28. Lianao Wu, University of Basque Country, Spain
    Title: Nonperturbative Leakage Elimination Operators
    Abstract: Dynamical decoupling operations have been shown to reduce errors in quantum information processing. Leakage from an encoded subspace to the rest of the system space is a particularly serious problem for which leakage elimination operators (LEOs) were introduced. Here we provide an analysis of nonideal pulses, rather than the well-understood idealization or bang-bang controls. Under realistic conditions, we show that these controls will provide the same protection from errors as idealized controls. Our work indicates that the effectiveness of LEOs depends on the integral of the pulse sequence in the time domain, which has been

missing because of the idealization of pulse sequences. Our results are applied to a three- level system for the nitrogen-vacancy centers under an external magnetic field and are illustrated by the fidelity dynamics of LEO sequences, ranging from regular rectangular pulses, random pulses, and even disordered (noisy) pulses.

29. Fengli Yan, Hebei Normal University, China
    Title: Exploration of multipartite entangled states by using weak nonlinearities
    Abstract: We propose several schemes for exploring multipartite entangled states based on linear optics and weak nonlinearities. Compared with the previous schemes the present methods are more feasible because there are only small phase shifts instead of a series of related functions of photon numbers in the process of interaction with Kerr nonlinearities. In the absence of decoherence we analyze the error probabilities induced by homodyne measurement and show that the maximal error probability can be made small enough even when the number of photons is large. This implies that the present schemes are quite tractable and it is possible to produce entangled states involving a large number of photons.

30. Lin Zhang, Hangzhou Dianzi University, China
    Title: Average subentropy, coherence and entanglement of random mixed states
    Abstract: The generic aspects of the entanglement for random pure states are known to be established via the powerful phenomenon of concentration of measure. Here, we find analytical expressions for the average subentropy and coherence over the set of random mixed states generated via various probability measures on it. Surprisingly, our results show that the average subentropy of random mixed states approaches to the maximum value of the subentropy which is attained for the maximally mixed state as we increase the dimension. In the special case of the random mixed states sampled from the induced measure via partial tracing of random bipartite pure states, we establish the typicality of the relative entropy of coherence for random mixed states invoking the concentration of measure phenomenon. In particular, we show that almost all random mixed states have relative entropy of coherence equal to the average relative entropy of coherence within an arbitrarily small error. As an important application of these results, we first generate a specific class of bipartite mixed states and then establish the typicality of relative entropy of entanglement and distillable entanglement of the states in this specific class. In particular, most of the random states in this specific class have relative entropy of entanglement and distillable entanglement equal to some fixed number (to within an arbitrary small error), thereby hugely reducing the complexity of computation of these entanglement measures for this specific class of bipartite mixed states.