

# Diffusion-Related-Papers-ICML-2025

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## Diffusion

### Theory

1. **Diffusion models for Gaussian distributions: Exact solutions and Wasserstein errors.** [\[pdf\]](#)
2. **S4S: Solving for a Fast Diffusion Model Solver.** [\[pdf\]](#)
3. **Morse: Dual-Sampling for Lossless Acceleration of Diffusion Models.** [\[pdf\]](#)
4. **Target Concrete Score Matching: A Holistic Framework for Discrete Diffusion.** [\[pdf\]](#)
5. **REG: Rectified Gradient Guidance for Conditional Diffusion Models.** [\[pdf\]](#)
6. **Multidimensional Adaptive Coefficient for Inference Trajectory Optimization in Flow and Diffusion.** [\[pdf\]](#)
7. **Generalized Interpolating Discrete Diffusion.** [\[pdf\]](#)
8. **Local Manifold Approximation and Projection for Manifold-Aware Diffusion Planning.** [\[pdf\]](#)
9. **Provable Efficiency of Guidance in Diffusion Models for General Data Distribution.** [\[pdf\]](#)
10. **A Mixture-Based Framework for Guiding Diffusion Models.** [\[pdf\]](#)
11. **Provable Maximum Entropy Manifold Exploration via Diffusion Models.** [\[pdf\]](#)
12. **REG: Rectified Gradient Guidance for Conditional Diffusion Models.** [\[pdf\]](#)
13. **Stochastic Control for Fine-tuning Diffusion Models: Optimality, Regularity, and Convergence.** [\[pdf\]](#)
14. **Adjoint Sampling: Highly Scalable Diffusion Samplers via Adjoint Matching.** [\[pdf\]](#)
15. **Distillation of Discrete Diffusion through Dimensional Correlations.** [\[pdf\]](#)
16. **Differentiable Solver Search for Fast Diffusion Sampling.** [\[pdf\]](#)
17. **Is Noise Conditioning Necessary for Denoising Generative Models?.** [\[pdf\]](#)

### Application

1. **AsymRnR: Video Diffusion Transformers Acceleration with Asymmetric Reduction and Restoration.** [\[pdf\]](#)
2. **Diffusion Adversarial Post-Training for One-Step Video Generation.** [\[pdf\]](#)
3. **IMPACT: Iterative Mask-based Parallel Decoding for Text-to-Audio Generation with Diffusion Modeling.** [\[pdf\]](#)
4. **DiTAR: Diffusion Transformer Autoregressive Modeling for Speech Generation.** [\[pdf\]](#)

5. **Q-VDiT: Towards Accurate Quantization and Distillation of Video-Generation Diffusion Transformers.** [\[pdf\]](#)
6. **Large Language Models to Diffusion Finetuning.** [\[pdf\]](#)
7. **Upcycling Text-to-Image Diffusion Models for Multi-Task Capabilities.** [\[pdf\]](#)
8. **Spherical-Nested Diffusion Model for Panoramic Image Outpainting.** [\[pdf\]](#)
9. **RIFLEx: A Free Lunch for Length Extrapolation in Video Diffusion Transformers.** [\[pdf\]](#)
10. **A First-order Generative Bilevel Optimization Framework for Diffusion Models.** [\[pdf\]](#)
11. **Ca2-VDM: Efficient Autoregressive Video Diffusion Model with Causal Generation and Cache Sharing.** [\[pdf\]](#)
12. **Zero-Shot Adaptation of Parameter-Efficient Fine-Tuning in Diffusion Models.** [\[pdf\]](#)
13. **History-Guided Video Diffusion.** [\[pdf\]](#)
14. **Human Body Restoration with One-Step Diffusion Model and A New Benchmark.** [\[pdf\]](#)
15. **Latent Diffusion Planning for Imitation Learning.** [\[pdf\]](#)

## Inverse Problem

1. **Variational Control for Guidance in Diffusion Models.** [\[pdf\]](#)
2. **SITCOM: Step-wise Triple-Consistent Diffusion Sampling For Inverse Problems.** [\[pdf\]](#)
3. **Integrating Intermediate Layer Optimization and Projected Gradient Descent for Solving Inverse Problems with Diffusion Models.** [\[pdf\]](#)
4. **Stochastic Deep Restoration Priors for Imaging Inverse Problems.** [\[pdf\]](#)
5. **Noise Conditional Variational Score Distillation.** [\[pdf\]](#)
6. **Inverse Problem Sampling in Latent Space Using Sequential Monte Carlo.** [\[pdf\]](#)

## Consistency Model

1. **Improving Consistency Models with Generator-Augmented Flows.** [[pdf](#)]
2. **Improved Discretization Complexity Analysis of Consistency Models: Variance Exploding Forward Process and Decay Discretization Scheme.** [[pdf](#)]
3. **VCT: Training Consistency Models with Variational Noise Coupling.** [[pdf](#)]
4. **Convergence of Consistency Model with Multistep Sampling under General Data Assumptions.** [[pdf](#)]

# Diffusion Bridges

## Schrödinger Bridge based

1. **Feature out! Let Raw Image as Your Condition for Blind Face Restoration.** [\[pdf\]](#)
2. **Neural Guided Diffusion Bridges.** [\[pdf\]](#)
3. **Categorical Schrödinger Bridge Matching.** [\[pdf\]](#)
4. **MixBridge: Heterogeneous Image-to-Image Backdoor Attack through Mixture of Schrödinger Bridges.** [\[pdf\]](#)
5. **Linear convergence of Sinkhorn's algorithm for generalized static Schrödinger bridge.** [\[pdf\]](#)
6. **DSRouter: End-to-end Global Routing via Diffusion Schrödinger Bridge.** [\[pdf\]](#)
7. **Trajectory Inference with Smooth Schrödinger Bridges.** [\[pdf\]](#)

## DDBMs based

1. **UniDB: A Unified Diffusion Bridge Framework via Stochastic Optimal Control.** [\[pdf\]](#)
2. **Inverse Bridge Matching Distillation.** [\[pdf\]](#)
3. **IRBridge: Solving Image Restoration Bridge with Pre-trained Generative Diffusion Models.** [\[pdf\]](#)
4. **FrameBridge: Improving Image-to-Video Generation with Bridge Models.** [\[pdf\]](#)

# Flow Matching

## Theory

1. **Multi-Marginal Stochastic Flow Matching for High-Dimensional Snapshot Data at Irregular Time Points.** [\[pdf\]](#)
2. **Computing Optimal Transport Maps and Wasserstein Barycenters Using Conditional Normalizing Flows.** [\[pdf\]](#)
3. **Variational Rectified Flow Matching.** [\[pdf\]](#)
4. **Controlled Generation with Equivariant Variational Flow Matching.** [\[pdf\]](#)
5. **INRFlow: Flow Matching for INRs in Ambient Space.** [\[pdf\]](#)
6. **Ensemble Distribution Distillation via Flow Matching.** [\[pdf\]](#)
7. **Flexible Tails for Normalizing Flows.** [\[pdf\]](#)
8. **Wasserstein Flow Matching: Generative Modeling Over Families of Distributions.** [\[pdf\]](#)
9. **SDE Matching: Scalable and Simulation-Free Training of Latent Stochastic Differential Equations.** [\[pdf\]](#)
10. **Elucidating Flow Matching ODE Dynamics via Data Geometry and Denoisers.** [\[pdf\]](#)
11. **Improving Flow Matching by Aligning Flow Divergence.** [\[pdf\]](#)
12. **An Error Analysis of Flow Matching for Deep Generative Modeling.** [\[pdf\]](#)
13. **Normalizing Flows are Capable Generative Models.** [\[pdf\]](#)
14. **Inverse Flow and Consistency Models.** [\[pdf\]](#)
15. **Gaussian Mixture Flow Matching Models.** [\[pdf\]](#)
16. **On the Guidance of Flow Matching.** [\[pdf\]](#)
17. **Stream-level Flow Matching with Gaussian Processes.** [\[pdf\]](#)

## Application

1. **EraseAnything: Enabling Concept Erasure in Rectified Flow Transformers.** [\[pdf\]](#)
2. **FlowAR: Scale-wise Autoregressive Image Generation Meets Flow Matching.** [\[pdf\]](#)
3. **DeFoG: Discrete Flow Matching for Graph Generation.** [\[pdf\]](#)
4. **One Diffusion Step to Real-World Super-Resolution via Flow Trajectory Distillation.** [\[pdf\]](#)

## AI4Science (with diffusion or flow)

### With Diffusion

1. **WyckoffDiff -- A Generative Diffusion Model for Crystal Symmetry.** [\[pdf\]](#)
2. **Kinetic Langevin Diffusion for Crystalline Materials Generation.** [\[pdf\]](#)
3. **Inverse problems with experiment-guided AlphaFold.** [\[pdf\]](#)
4. **All-atom Diffusion Transformers: Unified generative modelling of molecules and materials.** [\[pdf\]](#)
5. **GenMol: A Drug Discovery Generalist with Discrete Diffusion.** [\[pdf\]](#)
6. **Diffusion on Language Model Encodings for Protein Sequence Generation.** [\[pdf\]](#)
7. **Bridging Protein Sequences and Microscopy Images with Unified Diffusion Models.** [\[pdf\]](#)
8. **Reward-Guided Iterative Refinement in Diffusion Models at Test-Time with Applications to Protein and DNA Design.** [\[pdf\]](#)
9. **LDMol: A Text-to-Molecule Diffusion Model with Structurally Informative Latent Space Surpasses AR Models.** [\[pdf\]](#)
10. **UniMoMo: Unified Generative Modeling of 3D Molecules for De Novo Binder Design.** [\[pdf\]](#)

### With Flow

1. **Open Materials Generation with Stochastic Interpolants.** [\[pdf\]](#)
2. **CellFlux: Simulating Cellular Morphology Changes via Flow Matching.** [\[pdf\]](#)
3. **All-atom inverse protein folding through discrete flow matching.** [\[pdf\]](#)
4. **Pretraining Generative Flow Networks with Inexpensive Rewards for Molecular Graph Generation.** [\[pdf\]](#)
5. **Energy-Based Flow Matching for Generating 3D Molecular Structure.** [\[pdf\]](#)
6. **Compositional Flows for 3D Molecule and Synthesis Pathway Co-design.** [\[pdf\]](#)
7. **Flexibility-conditioned protein structure design with flow matching.** [\[pdf\]](#)
8. **ReQFlow: Rectified Quaternion Flow for Efficient and High-Quality Protein Backbone Generation.** [\[pdf\]](#)
9. **Efficient Molecular Conformer Generation with SO(3)-Averaged Flow Matching and Reflow.** [\[pdf\]](#)
10. **AffinityFlow: Guided Flows for Antibody Affinity Maturation.** [\[pdf\]](#)
11. **A Variational Perspective on Generative Protein Fitness Optimization.** [\[pdf\]](#)