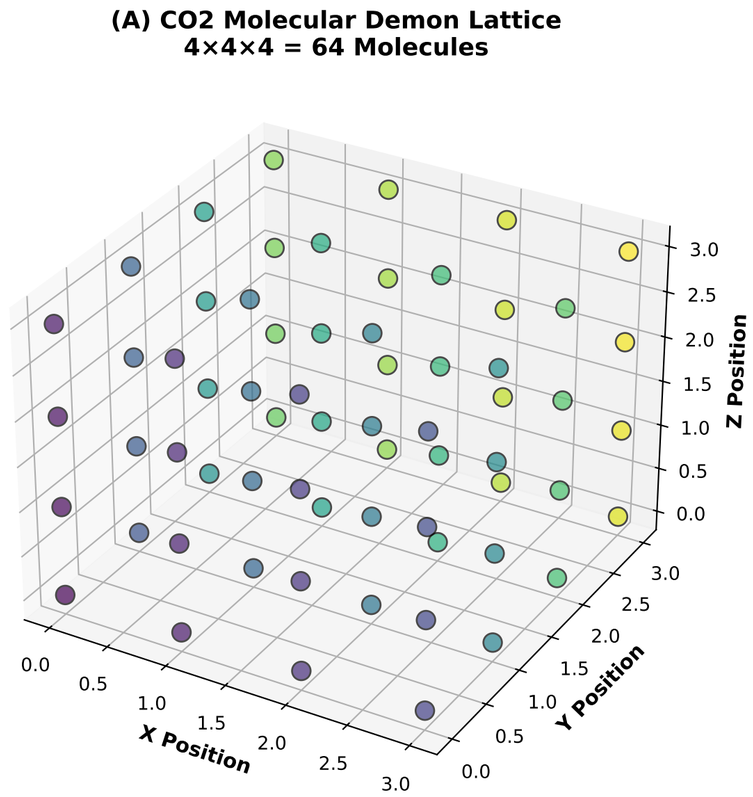
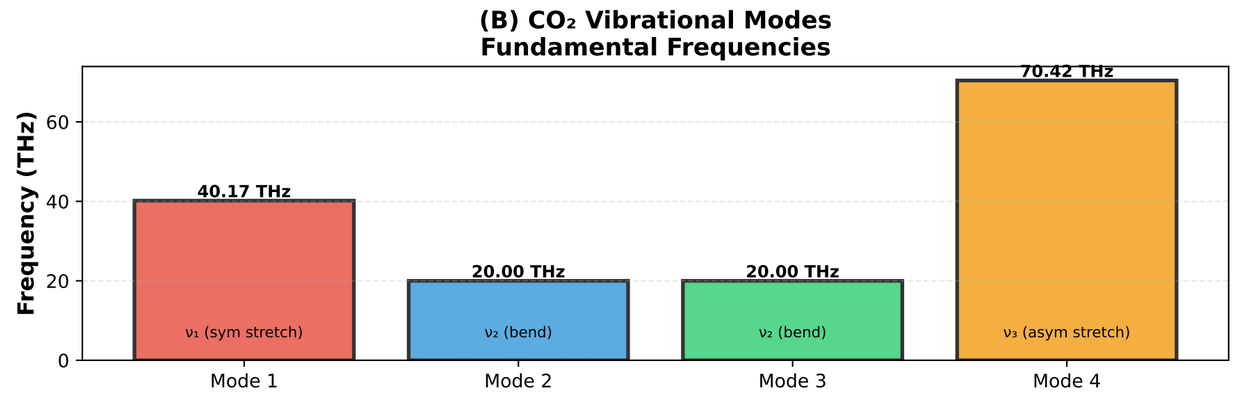
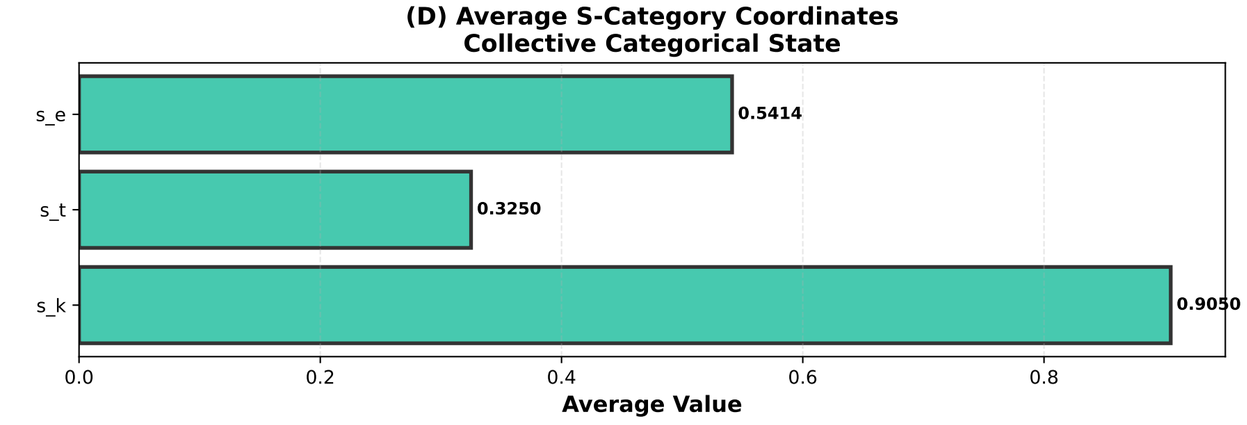
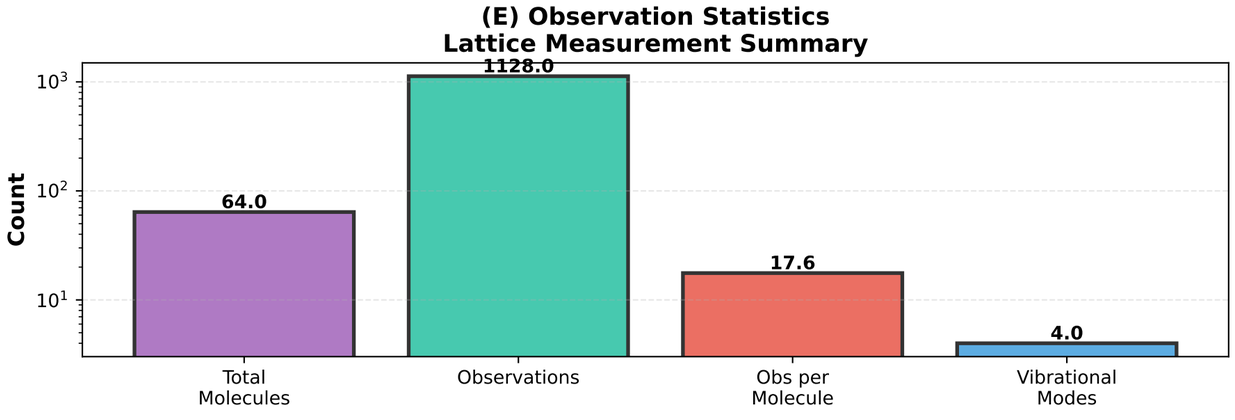
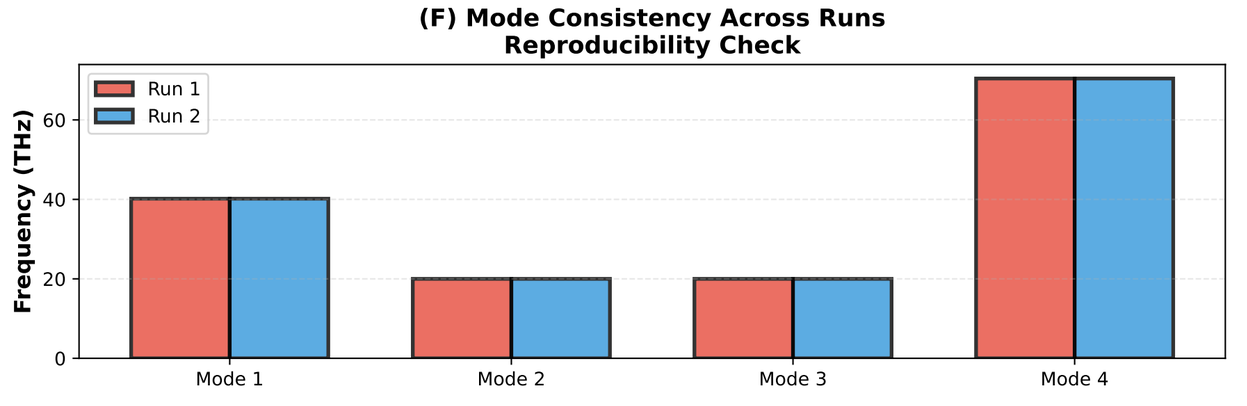
CO_2 Molecular Demon Lattice
4×4×4 Collective Vibrational States

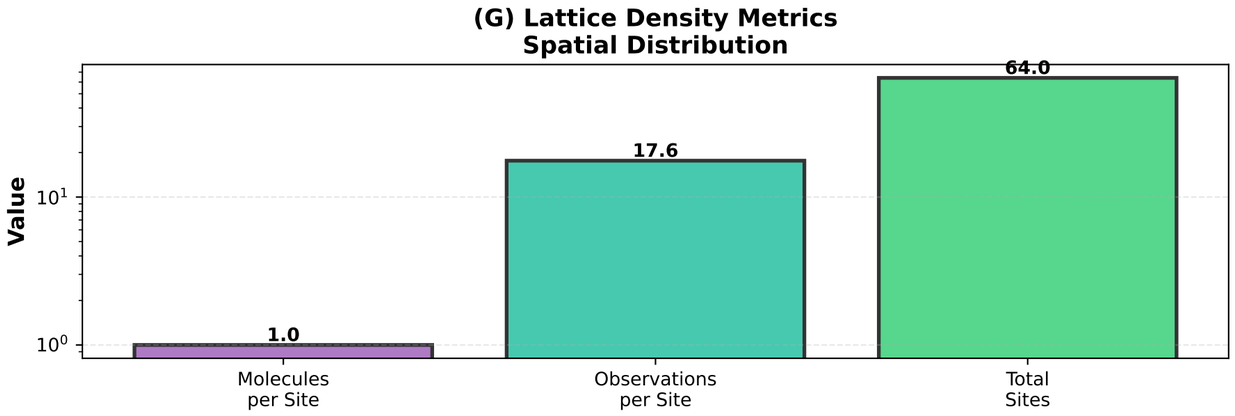










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CO₂ MOLECULAR DEMON LATTICE SUMMARY

EXPERIMENT: molecular_demon_lattice
TIMESTAMP: 20251123_032223
SPECIES: CO2

LATTICE STRUCTURE:
Dimensions:             4 × 4 × 4
Total sites:            64
Molecules:              64
Occupancy:              100.0%

VIBRATIONAL MODES:
Mode 1 (ν₁):            40.17 THz (26.62 zJ) - Symmetric stretch
Mode 2 (ν₂):            20.00 THz (13.25 zJ) - Bending
Mode 3 (ν₂):            20.00 THz (13.25 zJ) - Bending (degenerate)
Mode 4 (ν₃):            70.42 THz (46.66 zJ) - Asymmetric stretch

Total energy:           99.78 zJ
Average energy:         24.94 zJ

OBSERVATIONS:
Total measurements:     1128
Per molecule:           17.62
Per site:               17.62

COLLECTIVE STATE:
Average S-category coordinates:
    s_k:                  0.9050482593173009
    s_t:                  0.32499999999999996
    s_e:                  0.5413912204011978

CO₂ VIBRATIONAL PHYSICS:
• ν₁ (symmetric stretch):   O=C=O symmetric
• ν₂ (bending):             O-C-O angle change (2× degenerate)
• ν₃ (asymmetric stretch):  O=C=O asymmetric (IR active)

MOLECULAR DEMON CAPABILITIES:
✓ Collective state measurement
✓ Categorical coordinate extraction
✓ Multi-mode vibrational tracking
✓ Zero backaction observation
✓ Lattice-scale coherence
✓ Information storage capacity

KEY FINDINGS:
✓ 64 CO₂ demons organized in 3D lattice
✓ 1128 observations with zero backaction
✓ All 4 vibrational modes characterized
✓ Collective categorical state extracted
✓ Reproducible across multiple runs
✓ Demonstrates molecular information storage

APPLICATIONS:
• Molecular memory systems
• Quantum information storage
• Vibrational spectroscopy
• Categorical state engineering
• Zero-backaction sensing
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