SUMMARY OF RESEARCH

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Manifolds with flat torsion-free connections (affine manifolds) were studied since 1950-ies; there are many conjectures and just a few definite results. The strongest of these results, Cheng-Yau's proof of the Calabi-Yau theorem for Hessian metrics, was seemingly never used since then. Also, nobody approached the affine manifolds from the complex-geometric point of view, though any affine manifold with integer monodromy has it own complex counterpart, fibered over the real manifold with Lagrangian fibers. A similar doubling construction can be used to obtain quaternionic structure, starting from a flat complex manifold. Possible uses of this geometry in Mirror Symmetry were investigated by Kontsevich-Soibelman in "Affine structures and non-archimedean analytic space".

I am planning to investigate the interplay between the complex and flat geometry, with the possible applications to the Mirror Symmetry and the theory of Monge-Ampere equations.