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**Nucleon spin decomposition and orbital angular momentum in the nucleon**

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To get a complete decomposition of nucleon spin is a fundamentally important homework of QCD. In fact, if our researches end up without accomplishing this task, a tremendous efforts since the 1st discovery of the nucleon spin crisis would end in the air. We now have a general agreement that there are at least two physically inequivalent gauge-invariant decompositions of the nucleon. In these two decompositions, the intrinsic spin parts of quarks and gluons are just common. What discriminate these two decompositions are the orbital angular momentum (OAM) parts. The OAMs of quarks and gluons appearing in the first decomposition are the so-called "mechanical" OAMs, while those appearing in the second decomposition are the generalized (gauge-invariant) "canonical" ones. By this reason, these decompositions are broadly called the "mechanical" and "canonical" decompositions of the nucleon spin. Still, there remains several issues, which have not reached a complete consensus among the experts. (See the latest recent [1-2]). In the present talk, I will mainly concentrate on the practically most important issue, i.e. which decomposition is more favorable from the observational viewpoint. There are two often-claimed advantages of canonical decomposition. First, each piece of this decomposition satisfies the SU(2) commutation relation or angular momentum algebra. Second, the canonical OAM rather than the mechanical OAM is compatible with free partonic picture of constituent orbital motion. In the present talk, I will show that both these claims are not necessarily true, and push forward a viewpoint that the "mechanical" decomposition is more physical in that it has more direct connection with observables. I also emphasize that the nucleon spin decomposition accessed by the lattice QCD analyses is the "mechanical" decomposition not the "canonical" one. The recent lattice QCD studies of the nucleon spin decomposition are also briefly overviewed.

[1] E. Leader and C. Lorcé, arXiv : 1309.4235 [hep-ph] (2013).
[2] M. Wakamatsu, Int. J. Mod. Phys. A29, 1430012 (2014).