This talk will share our two recent results on low-tubal-rank tensor analysis. (1) **LRTR:** we establish a regularized tensor nuclear norm minimization (RTNNM) model for low-tubal-rank tensor recovery (LRTR). Then, we ini-
tiatively define a novel tensor restricted isometry property (t-RIP) based on
tensor singular value decomposition (t-SVD). Besides, our theoretical results
show that any third-order tensor $X \in \mathbb{R}^{n_1 \times n_2 \times n_3}$ whose tubal rank is at most $r$ can stably be recovered from its as few as measurements $y = M(X) + w$ with a bounded noise constraint $||w||_2 \leq \hat{\delta}$ via the RTNNM model, if the
linear map $M$ obeys t-RIP with $\delta_{tr}^M < \sqrt{(t - 1)/(n_3^2 + t - 1)}$ for certain fixed $t > 1$. (2) **TRPCA:** by incorporating prior information including the column and row space knowledge, we investigate the tensor robust principal component analysis (TRPCA) problem based on t-SVD. We establish suf-
cient conditions to ensure that under significantly weaker incoherence as-
sumptions than tensor principal components pursuit method (TPCP), our
proposed Modified-TPCP solution perfectly recovers the low-tubal-rank and
the sparse components with high probability, provided that the available prior
subspace information is accurate. In addition, we present an efficient algo-
rithm by modifying the alternating direction method of multipliers (ADMM)
to solve the Modified-TPCP program. Numerical experiments show that the
Modified-TPCP based on prior subspace information does allow us to recov-
er under weaker conditions than TPCP. The application of color video and
face denoising task suggests the superiority of the proposed method over the
existing state-of-the-art methods.

**Keywords:** Low-rank tensor recovery, tensor singular value decom-
position, tensor restricted isometry property, regularized, tensor robust principal
component analysis, prior subspace information, ADMM.