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Electronic excitations in a one-dimensional J=$\frac{1}{2}$ antiferromagnet observed by Raman scattering[1] MAI YE, JAE-WOOK KIM, Department of Physics and Astronomy, Rutgers University, CHOONG-JAE WON, Pohang Institue of Science and Technology, SANG-WOOK CHEONG, GIRSH BLUMBERG, Department of Physics and Astronomy, Rutgers University — A major focus of experimental interest in low-dimensional iridium oxides has been to explore the interplay of quantum fluctuation, spin-orbit coupling and electron correlation effects. $Ba_5CuIr_3O_{12}$ serves as an ideal playground and contains weakly-interacting chains along which J=$\frac{1}{2}$ iridium ions are antiferromagnetically coupled. The intercept obtained by extrapolating high-temperature inverse static magnetic susceptibility is around -270 K but no magnetic ordering occurs down to 4 K[2], indicating quanum fluctuation induced magnetic frustration. Here, we report polarized inelastic light-scattering spectrum of $Ba_5CuIr_3O_{12}$ as function of exciting laser energy and temperature. Low-energy magnetic response below 100 meV only appears when the system is excited along the chain direction, corresponding to local antiferromagnetic correlations. On the other hand, the spectral lineshape of high-energy d-d electronic transitions at 570 meV sheds light on the competition between localizing and itinerant tendency of electrons on iridium extended 5d orbits.

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[2]G. R. Blake et al., Chem. Mater. 10, 3536 (1998)

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