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Anisotropic magnetotransport near the ν=2/3 quantum Hall state

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We report experimental results on an anisotropic magnetotransport of a bilayer system with tunneling gap Δ_{SAS}=11K under tilted magnetic fields at ν=2/3. We have found that the longitudinal resistance of the system exhibits a tremendous change when the direction of applied in-plane field is changed. For lower tilting angle, the resistance with a current parallel to the in-plane field exceeds the one with a current perpendicular to the field by more than 1kΩ. As the tilting angle is increased, however, the difference between the two resistances vanishes. To investigate the phenomenon more in details, we have also studied the relation between the anisotropy and the quantum phase transition induced by an in-plane field. It is known that there are two ground states at ν=2/3 when we apply an in-plane field to bilayer systems. For weaker in-plane field, the state is "pseudospin polarized state", where the electron tunneling between the layers is allowed. On the contrary, for stronger field, the state is "pseudospin unpolarized state", where the tunneling is forbidden. We have revealed the existence of the anisotropy in the pseudospin polarized ground state. On the other hand, this anisotropy is absent in the pseudospin unpolarized ground state. These results imply that the anisotropy is essentially related with the electron tunneling between two layers. We shall also elucidate a conceivable mechanism of the anisotropy.