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VEX observes a New Type of Collisionless Shock

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Collisionless shocks are the most powerful cosmic rays accelerators and are responsible for the emission of gamma-ray bursts. Understanding of the shock structure is crucial for understanding of the processes of the redistribution of the upstream flow energy into accelerated particles and formation of downstream thermalised distribution. We report first observations (by Venus Express) of subcritical shocks that does not fit the well-established classical structure classification. It is shown that its abnormal structure is due to kinematic collisionless relaxation of downstream ions. The spatial gyrophase mixing leads to the formation of a downstream thermalised distribution, instead of various instabilities