This paper presents the detection, interpretation and removal of the signal resulting from interactions of high energy particles with the Planck High Frequency Instrument (HFI). These interactions fall into two categories, heating the 0.1 K bolometer plate and glitches in each detector time stream. Glitch shapes are not simple single pole exponential decays and fall into three families. The glitch shape for each family has been characterized empirically in flight data and removed from the detector time streams. The spectrum of the count rate/unit energy is computed for each family and a correspondence to where on the detector the particle hit is made. Most of the detected glitches are from galactic protons incident on the Si die frame supporting the micromachined bolometric detectors. At HFI, the particle flux is \( \approx 5 \) per square cm and per second and is dominated by protons incident on the spacecraft with an energy >39 MeV, leading to a rate of typically one event per second and per detector. Different categories of glitches have different signature in timestreams. Two of the glitch types have a low amplitude component that decays over nearly 1 second. This component produces an excess noise if not properly removed from the time ordered data. We have used a glitch detection and subtraction method based on the joint fit of population templates. The application of this novel glitch removal method removes excess noise from glitches. Using realistic simulations, we find this method does not introduce signal bias.