**Tjeng et al. Reply:** In our Letter [1] we have reported a spin-resolved resonant photoemission study on Ni metal using circularly polarized light, which revealed the presence of 3d⁸ triplets at low energies extending all the way to the Fermi level, both below and above Tc. The orbital degeneracy of the 3d band and the Hund’s rule splitting are therefore key elements for the understanding of Ni and other 3d ferromagnets. In the preceding Comment [2], van der Laan raises several objections concerning our interpretation of the experimental data. We will discuss these objections.

In his second paragraph, van der Laan states that the spin-resolved signal depends on even ground state moments and not on the spin or orbital moment. We have clearly stated in our Letter that this particular spectroscopic technique has the unique property that it measures the local 3d spin polarization independent of the orientation of the local moment, i.e., also in nonmagnetic isotropic materials. We have also provided an explanation using simple symmetry arguments. It is therefore implied, although we could have been more explicit on this point, that it is not \( M \) which is being measured, but rather a quantity related to \( M^2 \). So there is no disagreement with van der Laan on this point.

In the second and fourth paragraphs of the Comment, van der Laan claims that it is necessary to distinguish the resonant photoemission from the Auger decay signals for a correct interpretation of the data, and that this distinction is difficult to make. We disagree. In our experiment, the photon energy is chosen such that the intermediate state of the resonant photoemission process corresponds to the ground state of Ni in the presence of a \( 2p \) core hole. Whether the decay process is of the photoemission or of the Auger type is not relevant, since both are then degenerate. There is also no disagreement in the literature that the chosen intermediate state is primarily \( 2p^53d^{10} \), and that therefore the final state must be primarily \( 2p^63d^8 \).

In the third and fourth paragraphs of the Comment, van der Laan states that the spectra are determined by atomic Coulomb, exchange, and spin-orbit interactions, and that therefore one should not expect to see a change across \( T_c \). Moreover, van der Laan claims that the calculated atomic spectrum [3] provides a perfect agreement with our experimental results. While we agree that the high binding energy part of the spectrum is expected to be atomiclike, we disagree completely that the low energy part, i.e., the region close to the Fermi level and the 3d band, can be described or understood using atomic theory alone. Indeed, the calculations of van der Laan fail to reproduce the intensity in the first 3 eV of the spectrum. And we find experimentally that this is where the 3d⁸ triplets are, extending all the way to the Fermi level. In fact, to claim that atomic theory should do well corresponds to ignoring the essence of the Ni problem or, for that matter, of other 3d ferromagnets, i.e., the question of whether or not the atomic Hund’s rule correlations survive the strong band formation, both below and above \( T_c \).

In the first and fourth paragraphs, van der Laan claims that we have not demonstrated the presence of 3d⁸ in the ground state, and that other techniques are better suited. We would like to remark that the issue of the study is whether or not Hund’s rule is effective, i.e., whether the 3d⁸ states that are present in the ground state are of triplet or singlet character, and not so much whether the 3d⁸ are there. That 3d⁸ states are present is not a point of discussion, since this can be expected and understood using both one-particle and many-body approaches, although the distribution of the occupied 3d⁹ \( (n = 10, 9, 8, 7, \ldots) \) configurations will deviate from the binomial (statistical) distribution function in the presence of electron correlation effects. In fact, the 18% occupation for 3d⁸ in the ground state found in a many-body analysis by van der Laan [4] does not deviate too much from the one-particle binomial value of 15% [5], using van der Laan’s value of 9.19 for the average 3d occupation. Surely we all agree that there is band formation of some sort, so a purely atomic representation cannot describe the eigenstates, and consequently the 3d⁸ states will always be present. Our study therefore focuses on the spin character of the 3d⁸ states, and we remain with our conclusion that there are more triplets than singlets present in the ground state, since the triplet 3d⁸ spectral weight extends all the way to the Fermi level.


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