1072-57-181 **Selman Akbulut*** (`akbulut@math.msu.edu`), MSU, Dept of Mathematics, E. Lansing, MI 48824.

*Double knot surgeries to $S^4$ and $S^2 \times S^2$.*

It is known that $S^4$ is a union of two fishtails, and $S^2 \times S^2$ is a union of two cusps (glued along their boundaries). Here we prove that for any choice of knots $K, L \subset S^3$ performing knot surgery operations $S^4 \rightsquigarrow S^4_{K,L}$ and $S^2 \times S^2 \rightsquigarrow (S^2 \times S^2)_{K,L}$ along both of these fishtails and cusps, respectively, do not change the diffeomorphism type of these manifolds. A corollary of this is that the fishtail (an immersed $S^2$ with one self intersection) can exotically knot in $S^4$ infinitely many ways. We prove these results by giving a general sufficiency criterion when a knot surgery operation $X \rightsquigarrow X_K$ doesn't change the smooth structure of the underlying manifold $X$. Another application of this technique is that all "Scharlemann manifolds" $M(K)$ for all knots $K$ are standard (previously this was only proven for the trefoil knot by S. Akbulut in Ann of Math, 149 (1999), 497-510. Recall $M(K) \simeq S^1 \times S^3 \# (S^2 \times S^2)$ is obtained by surgering the meridianal circle $C \subset S^1 \times S^3_K$, where $S^3_K$ be the 3-manifold obtained from $S^3$ by $\pm 1$ surgery to $K$). (Received June 27, 2011)