

# On certain sums involving the Riemann zeta-function $\zeta(s)$

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A discussion involving the evaluation of the sum

$$\sum_{T < \gamma \leq T+H} |\zeta(\frac{1}{2} + i\gamma)|^2$$

and some related integrals is presented, where  $\gamma$  denotes imaginary parts of complex zeros of the Riemann zeta-function  $\zeta(s)$ . It is shown unconditionally that the above sum is  $\ll H \log^2 T \log \log T$  for  $T^{2/3} \log^4 T \ll H \leq T$ . Under these conditions it is also shown that

$$\int_T^{T+H} |\zeta(\frac{1}{2} + it)|^2 S(t) dt \ll H \log T \log \log T,$$
$$\int_T^{T+H} |\zeta(\frac{1}{2} + it)|^2 S^2(t) dt \ll H \log T (\log \log T)^2,$$

where  $S(T) = \frac{1}{\pi} \arg \zeta(\frac{1}{2} + iT)$ . This generalizes the results of [1].

## References

- [1] A. Ivić, On sums of squares of the Riemann zeta-function on the critical line, in “Proceedings of the Session in analytic number theory and Diophantine equations (Bonn, January–June 2002)”, eds. D.R. Heath-Brown and B.Z. Moroz, Bonner Mathematischer Schriften Nr. **360**, Bonn 2003, 17 pp.